DOCUMENT RESUME

ED 375 793 IR 016 810

AUTHOR Carroll, James; And Others
TITLE Arlington Public Schools Instructional Technology Strategic Plan: April 1994.
INSTITUTION Arlington County Public Schools, VA. Instructional Media & Tech. Dept.
PUB DATE Apr 94
NOTE 136p.
PUB TYPE Guides - General (050)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Computer Networks; Computer Software; Cost Estimates; Distance Education; *Educational Planning; *Educational Technology; Educational Television; Elementary Secondary Education; Library Automation; *Long Range Planning; Microcomputers; Mission Statements; Organizational Objectives; Program Implementation; Staff Development; Strategic Planning; Technological Advancement
IDENTIFIERS *Arlington Public Schools VA; *Technology Plans

ABSTRACT

This document contains the instructional technology strategic plan for the Arlington Public Schools (APS) as developed by the Instructional Media & Technology (IMT) Department, which was established in 1992. The mission of this department is to support teachers, students, and related instructional staff in the effective use of instructional, informational, and communications technologies to enhance the teaching-learning process. IMT currently consists of five units: Academic Computing, Distance Learning, Educational Television, Library Media Services, and the Teaching Materials Center. The report begins with an executive summary, which details the purpose and methods of two studies which were conducted to provide background information for the 5-year plan and lists its major new initiatives. The specifics of the plan are then introduced, including the background and evolution of instructional technology in APS, the purpose of the study, and the conclusions and findings from the Instructional Use Survey and Instructional Technology Focus Groups. The strategic plan, which makes up the major part of the report, is then presented, including goals, objectives, and action steps. It is divided into three sections: new initiatives; summary of implementation costs; and ongoing initiatives. Additional needs for full implementation of the plan are then identified, including IMT departmental reorganization, additional staff, and central office funding. A summary of research on the impact of instructional technologies on student learning and a historical perspective of program growth in the APS are also provided, and a brief summary concludes the report. (Contains 32 references.) (JLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 375 793

Instructional Media & Technology Department
Arlington Public Schools
Arlington, Virginia

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Arlington Public Schools

Instructional Technology Strategic Plan

April 1994

Submitted By:

James Carroll
Sheryl Asen
Dale Brown
Michael Johnson
Richard Kubalak
Patricia Teeke

IR016310

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

James K. Carroll

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Arlington Public Schools

Instructional Technology Strategic Plan

April 1994

ARLINGTON INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY: ARLINGTON PUBLIC SCHOOLS INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN 1

1.1 Purpose Of The Study 1
1.2 Method Used To Analyze Data And Draft The Instructional Technology Strategic Plan 1
1.3 Major New Initiatives Identified In The Strategic Plan 2
1.4 APS Instructional Technology Strategic Plan: Summary of Implementation Costs 5

2.0 INTRODUCTION TO THE INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN 9

2.1 Evolution Of Instructional Technology Programs In APS 9
2.2 Purpose Of The Study 11
2.3 Conclusions Resulting From Arlington's Instructional Technology Use Survey 11
2.4 Findings Of The Instructional Technology Focus Groups 12

3.0 INTRODUCTION TO THE INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN 14

3.1 Assumptions Leading to Plan 14
3.2 Mission Statements of the Division of Instruction and IMT 15

4.0 THE ARLINGTON PUBLIC SCHOOLS INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN: GOALS, OBJECTIVES, AND ACTION STEPS 16

4.1 APS Instructional Technology Strategic Plan: New Initiatives 16
4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs 56
4.3 APS Instructional Technology Strategic Plan: Ongoing Initiatives 61

5.0 ADDITIONAL NEEDS FOR FULL IMPLEMENTATION OF THE PLAN 66

5.1 IMT Departmental Reorganization 66
5.2 Additional IMT Central Level Staff 66
5.3 Full-time Building Based Instructional Technology Coordinators 68
5.4 IMT Central Office Base Funding 69

6.0 RESEARCH ON INSTRUCTIONAL TECHNOLOGIES: IMPACT ON INSTRUCTION AND SUPPORTING PRACTICES 70

7.0 AN HISTORICAL PERSPECTIVE OF PROGRAM GROWTH IN THE ARLINGTON PUBLIC SCHOOLS 78

8.0 SUMMARY 80

BIBLIOGRAPHY 82

1.0 EXECUTIVE SUMMARY: ARLINGTON PUBLIC SCHOOLS INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN

The Instructional Media & Technology (IMT) Department was established by Arlington Public Schools on July 1, 1992 as a support unit within the Division of Instruction. The department currently consists of five units including Academic Computing, Distance Learning, Educational Television, Library Media Services, and the Teaching Materials Center.

The mission of the IMT Department is to support teachers, students, and related instructional staff in the effective use of instructional, informational, and communications technologies to enhance the teaching-learning process.

1.1 Purpose Of The Study

During the 1992-93 school year, the IMT Department was charged by the School Board with drafting a five-year instructional technology strategic plan for Arlington Public Schools. Background information was collected from two sources. First, a 90-item written survey was drafted and mailed to 1200 instructional staff members in February of 1993. The purpose of this written survey was to determine the current status of instructional technology use in Arlington Public Schools across all grade levels. Phase two involved conducting a series of focus group sessions with teachers, library media specialists, building computer coordinators, administrators, and parents to identify future instructional technology needs. A total of 25 focus groups involving approximately 300 participants were conducted from March through May 1993.

The purposes of this phase of the study are to outline the major goals, objectives, and action steps of the five-year instructional technology strategic plan and to identify timelines and resources needed for their implementation.

1.2 Method Used To Analyze Data And Draft The Instructional Technology Strategic Plan

Weekly planning retreats with the IMT management team were held from September 1993 through early April 1994 to analyze data obtained from the instructional technology written survey and the 25 focus groups. Once the data were analyzed, the retreats were used to gain input from APS personnel whose collaboration will be needed to implement the plan. Retreats also were used to review and revise portions of the plan assigned to specific IMT management staff members and to draft the plan's goals, objectives, action steps, resource requirements, and implementation timelines. The strategic plan was completed on April 8, 1994.

Copyright (c) 1994, Arlington Public Schools, VA

1.3 Major New Initiatives Identified In The Strategic Plan

New initiatives are focused in seven goal areas.

1. To empower all students and instructional staff to acquire knowledge and skills necessary to function in an information society by supporting improved access to information through information technologies and services.

2. To enhance and improve the teaching and learning process through the effective use of instructional technology.

3. To infuse and integrate all forms of instructional technology into all aspects of Arlington Public Schools' instructional programs.

4. To train teachers and other instructional staff to become capable users of technology for instructional delivery, information access, and personal productivity.

5. To support selection and effective use of appropriate instructional media and technology.

6. To provide appropriate leadership to support effective information access and connectivity.

7. To assist schools in meeting their instructional media and technology hardware, software, training, and internal support needs through the procurement of appropriate levels of funding.

Related to the above seven goals are several new, interrelated initiatives.

- **Implementing APS' library automation project** to empower both students and instructional staff by providing them with the knowledge and skills needed to function in an information society through improved access to information technologies and services.

- **Hiring full-time building based Instructional Technology Coordinators (ITCs).** The addition of these positions will make it possible to keep up with instructional technology expansion that is recommended for each school by providing on-site support personnel to install new technology hardware, offer ongoing training in its use, troubleshoot minor hardware and software problems, coordinate the development and implementation of school-based instructional technology plans, and actively involve each school's community in learning about the roles of instructional technologies in education.

Copyright (c) 1994, Arlington Public Schools, VA

- **Expanding APS' distance learning program at the high school level and introducing this delivery system to the middle and elementary schools** to provide opportunities such as electronic fieldtrips and interactive audio / video projects similar to the National Science Foundation Global Schoolhouse Project.

- **Purchasing laptop computers to be issued to each APS teacher.** These computers will be used as productivity tools and as tools to enhance instructional presentations.

- **Completing a schedule of recommendations and procedures for hardware replacement and software upgrades.**

- **Replacing all obsolete classroom and lab computer systems** over a five year period at the high, middle, and elementary schools.

- **Replacing obsolete audio visual and television equipment in the schools.**

- **Upgrading IMT television production and distribution equipment, graphics production equipment, and all maintenance / diagnostic equipment** to provide improved services to Arlington instructional and administrative staff.

- **Replacing the outdated and unreliable cable television automated programming system and the ETV production recording / mastering system** by purchasing a system that has become the new industry standard to improve the quality of ETV services to the schools and community.

- **Initiating comprehensive school based and system-wide instructional technology staff development programs and facilities** to build a strong foundation for effective instructional technology use. This initiative includes the establishment of a new central Multimedia Training Center, adding an instructional materials preview and evaluation component to the Technology Demonstration Lab, and hiring additional staff to conduct training and oversee the functions addressed by these two facilities.

- **Establishing a permanent dedicated capital equipment replacement fund** to replace building-based or central IMT instructional technology equipment that has become obsolete or is beyond repair.

- **Networking all classrooms to libraries and to each other for data and video distribution** to provide teachers and students with enhanced opportunities to access all forms of instructional media and technology from the Library Media Center of each school.

Copyright (c) 1994, Arlington Public Schools, VA

- **Expanding access to state, national, and international computer networks and electronic bulletin boards** to bring the diversity of educational opportunities to all of Arlington's students and to instructional and administrative staff.

- **Establishing baseline instructional technologies** for Arlington schools to address equity issues by identifying and providing each school with minimum hardware requirements that will serve as a guide for future hardware expenditures.

- **Increasing school based instructional technology equipment funding through future increases in planning factor allocations** to give schools the opportunity to implement school-generated initiatives and to fund baseline equipment purchases.

- **Initiating annual discipline-based IMT grants** to enable Curriculum Supervisors and Program Coordinators to develop innovative uses of instructional technology in all elementary and secondary instructional programs.

- **Identifying potential sources of external funding** to help support new instructional technology initiatives.

- **Exploring new ways that instructional technology can be employed to extend and enhance communication among APS staff, parents, local businesses and libraries** to keep Arlington Public Schools looking toward the future.

Resources in the form of central and building-based personnel, hardware and software requirements, and facilities are detailed in the plan. A list of ongoing goals, objectives, and action steps scheduled for continuation are identified in the plan. Finally, research studies are cited that support the positive impact of instructional technology on the teaching-learning process.

Costs associated with the plan are detailed on the next four pages.

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

1.4 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
I A	1 Catalog	74,000	100,300	86,000	---	56,000	65,000	---	110,000	87,000	---	110,000	87,000	---	---	---	775,300
Library	2 Circulation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Automation	3 Bibliographic Utilities	---	---	---	---	---	---	---	---	6,000	---	---	10,500	---	---	16,000	32,500
	4 Acquisitions	---	---	---	---	---	---	---	---	---	---	3,000	1,000	---	---	1,000	5,000
	5 Automation Analyst	---	---	---	54,245	---	---	54,245	---	---	54,245	---	---	54,245	---	---	216,980
		74,000	100,300	86,000	54,245	56,000	65,000	54,245	110,000	93,000	54,245	113,000	98,500	54,245	---	17,000	1,029,780
I B	1 Develop Automation Policies	---	---	---	---	---	28,300	---	---	28,300	---	---	28,300	---	---	28,300	113,200
External	2 Access Internet etc	---	---	---	---	---	12,000	---	---	14,000	---	---	28,000	---	---	34,000	88,000
Information	3 BBS Access	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	25,000
Access	4 Expand DL Services	---	---	12,000	---	---	15,000	---	---	20,000	---	---	20,000	---	---	20,000	87,000
		---	---	17,000	---	---	60,300	---	---	67,300	---	---	81,300	---	---	87,300	313,200
II A	1 ITCs	---	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	5,494,104
School	2 Interview Teams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Level	3 On-Site Support	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Support	4 Baseline Recommendations	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	5 Replacement Schedule	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		---	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	5,494,104
II B	1 DL Specialist	---	---	---	72,235	---	---	72,235	---	---	72,235	---	---	72,235	---	---	288,940
Alternate	2 DL Program	46,600	---	7,900	46,600	---	13,900	60,800	---	28,100	60,800	---	28,100	60,800	---	28,100	381,700
Delivery	3 Add Electr Classrooms	---	---	---	---	30,000	39,000	---	65,000	---	---	65,000	---	---	57,500	---	256,500
Systems	4 Distance Learning System	---	1,000	---	---	1,000	10,000	---	1,000	10,000	---	1,000	10,000	---	1,000	10,000	45,000
	5 DL Inst Dev Specialist	---	---	---	---	---	---	61,276	---	---	61,276	---	---	61,276	---	---	185,828
	6 Telecom Engineer	---	---	---	---	---	---	58,379	---	---	58,379	---	---	58,379	---	---	175,137
		46,600	1,000	7,900	118,835	31,000	62,900	252,690	66,000	38,100	252,690	66,000	38,100	252,690	58,500	38,100	1,331,105

* Personnel includes salaried, hourly, full-time, and part-time positions.

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses.

FILE: P-COMB-6.XLS 1 4/11/94

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

1.4 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
II C Supervisor Support	1 Grants	---	---	---	---	50,000	50,000	---	50,000	50,000	---	50,000	50,000	---	50,000	50,000	400,000
III A	1 Comp Sys Specialist	61,276	---	---	61,276	---	---	61,276	---	---	61,276	---	---	61,276	---	---	306,380
Hardware	2 Replace HS computers	---	---	---	---	400,000	---	---	412,500	---	---	300,000	---	---	350,000	---	1,462,500
Software	3 Replace MS computers	---	---	---	---	362,500	---	---	262,500	---	---	262,500	---	---	237,500	---	1,125,000
	4 Replace ES computers	---	70,000	---	---	925,000	---	---	375,000	---	---	275,000	---	---	275,000	---	1,920,000
		---	70,000	---	---	1,687,500	---	---	1,050,000	---	---	837,500	---	---	862,500	---	4,507,500
	5 Teacher Computers	---	---	---	---	700,000	65,000	---	700,000	65,000	---	700,000	65,000	---	700,000	65,000	3,060,000
	6 AV Equipment	---	126,000	---	---	150,000	---	---	150,000	---	---	150,000	---	---	150,000	---	726,000
	7 Comp Repair Technician	---	---	---	39,726	---	---	39,726	---	---	39,726	---	---	39,726	---	---	158,904
	8 Repair, TV, Graphics Equip	---	---	---	---	105,000	---	---	50,000	---	---	25,000	---	---	45,000	---	225,000
	9 TV Dist System	---	26,000	---	---	82,400	---	---	30,900	---	---	23,700	---	---	---	---	163,000
	10 Van Equipment	---	---	---	---	---	---	---	40,000	---	---	40,000	---	---	---	---	80,000
		---	26,000	---	---	187,400	---	---	120,900	---	---	88,700	---	---	45,000	---	468,000
IV A School-Based Training	1 ITC Staff Dev Subs	---	---	---	---	---	78,000	---	---	78,000	---	---	78,000	---	78,000	---	312,000

* Personnel includes salaried, hourly, full-time, and part-time positions

FILE: P:COMB-6.XLS 2 4/11/94

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

1.4 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
IV B	1 Demo Lab	---	---	---	---	8,000	---	---	8,000	---	---	8,000	---	---	8,000	---	32,000
System	2 Develop Training Program	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Wide	3 Training Specialist	---	---	---	59,782	---	---	59,782	---	---	59,782	---	---	59,782	---	---	239,128
Staff	4 Training Center	---	---	---	---	---	---	---	90,000	24,000	---	---	24,000	---	---	24,000	162,000
Develop-	5 Inst Mat Specialist	---	---	---	59,782	---	---	59,782	---	---	59,782	---	---	59,782	---	---	239,128
ment	6 Update Train Center	---	---	---	---	---	20,000	---	---	20,000	---	---	20,000	---	---	20,000	80,000
	7 System Wide Subs	---	---	---	---	---	30,000	---	---	30,000	---	---	30,000	---	---	30,000	120,000
	8 Lending Library	---	---	2,500	---	---	2,500	---	---	2,500	---	---	2,500	---	---	2,500	12,500
	9 Training Services	---	---	---	---	---	10,000	---	---	10,000	---	---	10,000	---	---	10,000	40,000
		---	---	2,500	119,564	8,000	62,500	119,564	98,000	86,500	119,564	8,000	86,500	119,564	8,000	86,500	924,756
IV C	1 Production services	---	---	---	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	12,000
D of I Staff Development																	
V A	1 Dev Process	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Preview	2 Preview Center	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	25,000
Center	3 Site Licenses	---	---	7,500	---	---	39,000	---	---	39,000	---	---	39,000	---	---	39,000	163,500
		---	---	12,500	---	---	44,000	---	---	44,000	---	---	44,000	---	---	44,000	188,500
VI A	1 Consultant Services	---	---	10,000	---	---	5,000	---	---	---	---	---	---	---	---	---	15,000
Infomation	2 Networking Specialist	---	---	---	64,159	---	---	64,159	---	---	64,159	---	---	64,159	---	---	256,636
Distribution	3 Network Classrooms	---	---	---	---	852,617	---	---	852,617	---	---	852,617	---	---	852,617	---	3,410,468
Infrastructure	4 External Communications	---	---	---	---	---	10,000	---	---	10,000	---	---	10,000	---	---	10,000	40,000
		---	---	10,000	64,159	852,617	15,000	64,159	852,617	10,000	64,159	852,617	10,000	64,159	852,617	10,000	3,722,104

* Personnel includes salaried, hourly, full-time, and part-time positions

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

FILE: P:COMB-6.XLS 3 4/11/94

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

1.4 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 riardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
VII A	1 Comp Equipment	---	85,000	---	---	---	---	---	---	---	---	---	---	---	---	---	85,000
School	2 Inst Tech Equipment	---	---	---	---	262,500	---	---	360,000	---	---	450,000	---	---	450,000	---	1,522,500
Based		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Funds		---	85,000	---	---	262,500	---	---	360,000	---	---	450,000	---	---	450,000	---	1,607,500
VII B	1 Identify Sources	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	15,000
External	2 ID Sale Materials	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Funding	3 Marketing Plan	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	15,000
Category Totals		181,876	408,300	138,900	1,831,331	3,985,017	508,700	1,965,186	3,557,517	537,900	1,965,186	3,315,817	557,400	1,965,186	3,254,617	403,900	24,576,833
FY Total			729,076			6,325,048			6,060,603			5,838,403			5,623,703		

* Personnel includes salaried, hourly, full-time, and part-time positions

FILE: P:COMB.6.XLS 4 4/11/94

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

2.0 INTRODUCTION TO THE INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN

The Arlington Public Schools Instructional Technology Strategic Plan described in this document sets forth a five-year vision for the role of instructional technology in the curriculum and instructional programs of the county schools. A strategic plan is essential for realizing the promise instructional technology holds for enhancing the teaching-learning process and empowering students to become lifelong learners capable of critical thinking and problem solving.

This document includes:

- an historical background of instructional technology found in APS and its relation to the development of the instructional technology strategic plan
- a brief description of the current status of instructional technology use in Arlington Public Schools
- a summary of the findings of numerous focus groups conducted during the Spring 1993 to gather data for drafting the strategic plan
- a list of new initiatives and ongoing instructional technology goals, objectives and action steps
- identification of timelines and resources for implementing each component of the plan, and
- a review of research on the instructional technologies reflected in this strategic plan.

2.1 Evolution Of Instructional Technology Programs In APS

The evolution of the Instructional Media & Technology Department has followed a path similar to that found in many public school systems in Virginia and throughout the United States. In 1944 the first component of the present department, the Teaching Materials Center, was established. This unit, under the direction of a supervisor, was responsible for ordering and distributing audio-visual materials, beginning with 16mm film services. In 1948 a supervisor of libraries was added to the system. This individual's primary responsibility involved the acquisition and circulation of print materials. Such an organizational pattern was adopted within the Virginia Department of Education and later emulated by more progressive school systems within the state. As funding became available from federal, state, and local levels, school libraries moved gradually from a print orientation to multimedia

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

instructional materials centers with a greater emphasis on support of the curriculum and instructional programs. Funding was centralized at the outset, but later was decentralized to the building level for collection development. The Teaching Materials Center eventually incorporated a wide range of graphics services in addition to film distribution and instructional equipment acquisition and maintenance.

Next, television emerged as an instructional medium. Educational channels were created to serve the region. Then television receivers, master antenna systems, and video cassette recorders appeared on the scene. A cable franchise was awarded by Arlington County in the late 1970s, thus bringing cable television to Arlington residents and APS. With the construction of the Career Center and the development of a television production and training center, telecommunications (educational television) was placed under a full-time coordinator. In 1991 the supervision of Educational Television was reassigned to the Supervisor of the Teaching Materials Center.

Academic Computing emerged from mathematics to become an independent unit in instruction. In Fall 1985 the staffing evolved from a half-time secondary specialist to one full-time secondary and one full-time elementary specialist. To supplement these two new positions, Building Computer Coordinator (BCC) contact teachers were added to each school.

In 1987 the Governor's Technology Initiative provided funds to purchase satellite dishes for the high schools and Career Center, thus initiating the age of teleconferencing in Arlington Public Schools.

In 1987-88 a system-wide technology study was conducted that resulted in recommendations for consolidating all instructional technology functions into one department under one director. Staff from the various technology units began to meet during the 1990-91 school year to coordinate technology activities, thus constituting an embryonic Instructional Media & Technology Department.

An Assistant Director for Instructional Media & Technology was hired in August 1992 to administer this new department, initiate distance learning courses and staff development activities via electronic classrooms, and develop and implement an instructional technology strategic plan.

Copyright (c) 1994, Arlington Public Schools, VA

2.2 Purpose Of The Study

At the beginning of the 1992-93 school year, the IMT Department was charged by the School Board with drafting a five-year instructional technology strategic plan for APS. Information needed to complete the plan was collected via two sources. First, a 90-item written survey was drafted and mailed to 1200 instructional staff in February of 1993. The purpose of this written survey was to determine the current status of instructional technology use in Arlington Public Schools across all grade levels. Phase two involved conducting a series of focus group sessions with teachers, library media specialists, building computer coordinators, administrators, and parents to identify future instructional technology needs. A total of 25 focus groups involving approximately 300 participants were conducted from March through May of 1993.

The purposes of this phase of the study are to outline the major goals, objectives and action steps of the Instructional Technology Plan and to identify timelines and resources needed for their implementation.

2.3 Conclusions Resulting From Arlington's Instructional Technology Use Survey

Eight hundred six questionnaires were completed and returned. Completed surveys were tabulated and analyzed by individual school response, school level (i.e., elementary, middle, high), and content / discipline area.

Numerous findings resulted from administering the instructional technology use survey. A complete listing of these findings can be found in the IMT report entitled, "Current Status Of Instructional Media & Technology Use In Arlington Public Schools," dated July 1993. Copies of this report can be found in each of the APS school libraries. Additional copies are available from the Instructional Media & Technology Department.

In reviewing the APS instructional technology use survey findings, the following conclusions can be drawn.

- Classroom computer use appears to be the most extensive at the elementary level, diminishing as students reach the middle and high school levels. This may be attributable to the fact that most elementary classrooms contain at least one computer, while the middle and high schools have chosen to place the majority of their computers in labs, thus limiting access. This trend of placing computers in classrooms has just begun to occur in some of the secondary schools.

Copyright (c) 1994, Arlington Public Schools, VA

- Although higher level use of computers has become more widespread since the study conducted in 1988, the more prevalent use continues to be drill and practice.

- Traditional instructional technologies continue to play a significant role in Arlington's instructional programs. Included in this group are 35mm slide projectors, overhead, filmstrip, and opaque projectors, VCRs, camcorders, and audio cassette players.

- Newer instructional technologies such as LCD panels, CD-ROMs, interactive videodisc systems, modems, fax machines, and online electronic library catalog systems are being widely installed and used.

2.4 Findings Of The Instructional Technology Focus Groups

Six broad categories were used to report the findings of the 25 focus groups conducted by IMT personnel last spring. These categories include: Instructional Delivery; Staff Development; Information Access / Connectivity / Communication; Personnel; System-Wide Support For Technology; and Instructional Issues Involving Technology. Readers who are interested in a complete listing of focus group recommendations are invited to read the "Technology Needs Assessment Focus Group Summary Report." Copies of this report are found in each APS library and are available from the IMT Department.

In general, focus group participants identified the need for building-wide computer networks linking classrooms to one another and the library; additional computer labs and classroom computers with multimedia capability; enhanced modem communication; and additional building based technology including laserdiscs, camcorders, and conventional forms of AV equipment.

Participants voiced their strong support for the hiring of full-time building level personnel to oversee instructional technology programs at each school.

On-site training conducted during the instructional day was viewed as essential. Participants also asked for training to accommodate the needs and skill levels of both the instructional technology novice and expert.

Participants requested library automation, networks linking teachers' stations, classrooms, and libraries, modem communication tied to information services, and applications of CD-ROM and laserdisc technologies.

Copyright (c) 1994, Arlington Public Schools, VA

Participants stated technology should be considered during the initial stages of curriculum development. Participants also expressed a need for Curriculum Supervisors to serve as technology role models for teachers and specialists in their content areas.

Finally, focus group participants noted technology's ability to increase teacher productivity and the need for APS and IMT to promote and support such use.

Copyright (c) 1994, Arlington Public Schools, VA

3.0 INTRODUCTION TO THE INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN

The goals, objectives, and action steps of this plan are based on the overall belief that instructional technologies (traditional, evolving, and emerging) are essential to facilitate student learning in contemporary education and to prepare students for productive and enriched lives as adults. Additional basic assumptions about the relationships between instructional technology and schooling serve as the foundation for guiding practices outlined in this plan.

3.1 Assumptions Leading To The Plan

Technology can be used to empower students and improve learning. When technology is used as a tool for learning, students can expand their base of knowledge and concepts and develop and improve abilities to: access, analyze, evaluate, synthesize, create, and communicate information; develop and improve problem solving, decision making, and critical thinking skills; work as active learners in independent, cooperative, and collaborative ways with diverse populations making up the global community.

Technology can be used to support teachers and curriculum staff in providing a quality instructional program. Instructional technology facilitates teacher collaboration, curriculum integration, assessment, and communication with parents and other community members. Instructional technologies provide teachers with a means of meeting the learning needs of students with differing abilities and interests. Instructional staff who use technology for personal productivity are more likely to creatively and effectively use technology in instruction.

There are key services and practices that are interrelated and must be in place to ensure the highest quality and most effective use of instructional technologies. Supporting resources include full-time central and building based technology staff for instructional and technical leadership, up-to-date and readily accessible training facilities and staff development programs; continual review and revision of strategic plans; and continual acquisition of new and replacement hardware and software. Finally, the primary source of funding must be based in the school operating budget, with options available to seek additional monies for program enhancement from outside sources such as public and private grants, bond initiatives, and business partnerships.

In addition to these assumptions, the following principles, identified by Hurly & Hylnka (1982), provide important guidelines.

- Decision makers must be prepared to amortize high capital start-up costs over a long period of time.

Copyright (c) 1994, Arlington Public Schools, VA

- An extensive infrastructure and an educational support system are required.
- Teachers must receive information about an innovation, training in its use, curriculum materials to assist in integrating the application, long-term support services, and incentives to change.
- Courseware must be well designed and compatible with a philosophy of application that stresses creative and productive uses.

3.2 Mission Statements Of The Division Of Instruction and IMT

An important aspect of any strategic plan is a clear understanding of an organization's or department's mission statement. The following two mission statements are integral to this strategic plan.

The Division of Instruction, the administrative unit directing the activities of the Instructional Media & Technology Department, recently adopted the following mission statement.

> The Division of Instruction collaborates with teachers and principals to identify, plan and evaluate instruction for students.

In general, this mission defines the overall purpose of the Division of Instruction and its many component parts including the Instructional Media & Technology Department. To assist the Division of Instruction, IMT has adopted the following mission statement.

> The mission of the Instructional Media & Technology Department is to support teachers, students, and related instructional staff in the effective use of instructional, informational, and communications technologies to enhance the teaching-learning process.

To implement this mission, the IMT Department currently provides APS staff with instructional technology support including the acquisition of print and non-print media, video and graphics production services, instructional computing services, distance learning services including the maintenance and effective use of electronic classrooms at the high school level, teleconferencing services, hardware acquisition and repair services, and the development and delivery of training programs in the application of instructional technology.

Copyright (c) 1994, Arlington Public Schools, VA

4.0 THE ARLINGTON PUBLIC SCHOOLS INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN: GOALS, OBJECTIVES, AND ACTION STEPS

To expand and improve the use of instructional technology throughout APS instructional programs, the IMT Department proposes a five-year plan consisting of new initiatives and ongoing strategic goals, objectives, and action steps.

IMT management realizes that adoption of its technology plan will require a substantial investment of resources and, as a result, its full implementation may extend beyond a five-year period. To assist in reviewing the plan, IMT management has identified resources needed to implement each of the plan's goals, objectives, and action steps. Although implementation timelines are suggested for each of the component parts of the plan, decisions can be made to implement the plan in phases as resources become available through general operating funds, bond funds, dedicated capital equipment replacement funds, or external funds from government grants, private foundations, or donors.

4.1 APS Instructional Technology Strategic Plan: New Initiatives

Several new instructional technology initiatives are proposed by IMT management for implementation during FY95-FY99. The goals, objectives, action steps, associated costs, and suggested implementation timelines appear in the following action plan.

Copyright (c) 1994, Arlington Public Schools, VA

APS INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN
NEW INITIATIVES ACTION PLAN

GOAL I

To empower all students and instructional staff to acquire knowledge and skills necessary to function in an information society by supporting improved access to information through information technologies and services.

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
I.A. Develop and implement library automation in all schools and the Professional Library.	1.	Create an online public access catalog (OPAC) in each school library which includes all instructional resources in the system.	FY 95	**$260,300** Superintendent's Initiative and Baseline Budget: Covers automation hardware costs for four high school sites and Professional Library. Also includes Media Processing Center hardware upgrade. Reflects costs for computers, peripherals, scanners, LAN upgrade and printers. Costs for Gunston and Claremont sites included in base budget for these schools for FY95 ($74,300). $13,000 per site for automation hardware as specified above ($26,000). Inventory Conversion: $20,000 per site for W-L, Wakefield, Yorktown ($60,000). HB-Woodlawn ($10,000). Professional Library ($4,000). Hourly support personnel to implement collection conversion from card catalog to an online electronic database, using the NOTIS system ($74,000). Training six sites at $2,000 per site ($12,000).	Creation of an online public access catalog will provide students with bibliographic access to all library resources within the system as well as to the total collection of the Arlington Public Library and other institutions. Through CAPCON and OCLC (Online Computer Library Center) students also will have access to 40 million bibliographic records and will be able to search expanded resources through the electronic catalog.
			FY 96	**$121,000** $14,000 per site, four middle schools ($56,000). Operation of bibliographic utilities (OCLC via CAPCON) cataloging and conversion of database ($14,000). $10,000 per site for inventory conversion: Professional and support personnel to implement collection conversion from card catalog to an online electronic database using the NOTIS system ($40,000). Supplies -- barcode and new supply needs ($3,000). Training four sites at $2,000 per site ($8,000)	

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
I.A. (continued) Develop and implement library automation in all schools and the Professional Library.	1.	(continued) Create an online public access catalog (OPAC) in each school library which includes all instructional resources in the system.	FY 97 FY 98	**$197,000** Automation hardware, 10 elementary school library sites at $11,000 per site ($110,000). Operation of bibliographic utilities ($14,000). $5,000 per site for inventory conversion. Professional and support personnel to implement collection conversion from card catalog to an online electronic database using the NOTIS system ($50,000). Supplies -- barcodes and new supply needs ($3,000). Training -- 10 sites at $2,000 per site ($20,000). **$197,000** Automation hardware, 10 elementary school library sites at $11,000 ($110,000). Operation of bibliographic utilities ($14,000), $5,000 per site for inventory conversion. Professional and support personnel to implement collection conversion from card catalog to an online electronic database using the NOTIS system ($50,000). Supplies -- barcodes and new supply needs ($3,000). Training -- 10 sites at $2,000 per site ($20,000).	(see above)
	2	Develop an automated circulation system	FY 95 - FY 99	Hardware and training costs included in previous entry. (Implementation concurrent with action step #1 - online catalog.)	An automated circulation system creates a more efficient way to circulate materials and provides accurate patterns of collection use. The system enables resource sharing and cooperative collection development and facilitates the inventory process.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
I.A. (continued) Develop and implement library automation in all schools and the Professional Library.	3.	Provide bibliographic utilities software and licensing for networking (e.g., Books in Print)	FY 97 FY 98 FY 99	**$6,000** Purchase CD-ROM software ($3,000) for four high schools, Professional Library and Media Processing Center. (Books in Print, Textbooks K-12 in Print, Children's Books in Print, Elementary School Library Collection) Network to serve all six sites. Pay licensing fees ($3,000). **$10,500** Continue licensing for above sites ($3,000). Add licensing for 15 additional sites (5 middle schools and ten elementary schools ($7,500). **$16,000** Continue licensing fees for above sites ($10,500) and add eleven more elementary sites ($5,500).	Electronic access to bibliographic utilities via licensing and networking will provide librarians, teachers, and students with widespread, modern methods of accessing basic information sources.
	4.	Implement an automated acquisitions system.	FY 98 FY 99	**$4,000** Implement an automated acquisition system, computer and peripherals ($3,000). Training for Media Center staff, and Librarians ($1,000). **$1,000** Continuing support for training.	An automated acquisition system provides an efficient method to acquire instructional resources. This is the final phase of library automation.
	5.	Hire a Library Automation Programmer Analyst for the library automation project.	FY 95	**$54,245** Library Automation Programmer Analyst (salary - $42,545; benefits - $11,700). An upgrade of an existing open position in the Media Processing Center is recommended to create this new position.	The Library Automation Programmer Analyst will provide technical support and training for implementing NOTIS, the library automation system. This person will provide the interface between APS and OTIS and between APS and the Arlington Public Library to maintain the additional 30 school sites.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
I.B. Provide expanded student and instructional staff access to external sources of information through technology.	1.	Develop policies, procedures, and protocols with regional libraries and other information sources to allow network and resource sharing.	FY 96 FY 97 - ongoing	**$28,300** Consultant fees for planning interlibrary policies and protocols ($2,000). Electronic document delivery costs: Elementary school libraries ($200 per site = $4,200); Middle School Libraries ($300 per site = $1,500); High School Libraries and Professional Library ($500 per site, $2,500). Interlibrary Loan Materials Shipping Costs (Resource Sharing): Elementary School Libraries ($100 per site = $2,100), Middle School Libraries ($100 per site = $1,000); High Schools and Professional Library ($3,000 per site = $15,000). **$28,300** Electronic document delivery costs and delivery fees (document delivery and interlibrary loan).	Proliferation of resources will require resource sharing within the system as well as on regional, state, national, and international levels.
	2.	Expand access to state, national, and international networks (e.g., Internet).	FY 96 FY 97 FY 98 FY 99	**$13,700** Computer, modem, and peripherals for four high schools and Professional Library -- dedicated Internet user sites ($12,500);. staff training ($1,200). **$13,000** Add five middle schools ($12,500); staff training ($500). **$26,000** Add ten elementary schools ($25,000); staff training ($1,000). **$28,600** Add eleven elementary schools ($27,500); staff training ($1,100).	Expanding access to state, national, and international networks will enable Arlington teachers to communicate with their colleagues around the U.S. and the world. This will provide teachers with a valuable resource to share ideas regarding teaching strategies and various educational issues. It will also afford students an opportunity to communicate with other students from distant states and countries, thus broadening their knowledge of the world at large.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
I.B. (continued) Provide expanded student and instructional staff access to external sources of information through technology.	3.	Expand access to electronic bulletin boards.	FY 95 - ongoing	**$5,000** Annual fee for subscriptions to new electronic bulletin boards.	Expanding access to electronic bulletin boards will have a positive impact on both students and teachers as new sources of information will be available both during and after each school day.
	4.	Provide expanded distance learning services, including the production of live teleconferences on topics appropriate to K-12 education.	FY 95 FY 96 FY 97 - ongoing	**$12,000** Instructional materials ($5,000) , production support ($3,000), teleconference registration fees ($4,000). **$15,000** Instructional materials ($5,000), production support ($5,000), and teleconference registration fees ($5,000). **$20,000** Instructional materials ($7,000), production support ($6,000), and teleconference registration fees ($7,000).	APS' distance learning program will expand its high school course offerings during the next five years from its current single course offering. In addition, APS plans to conduct local staff development workshops in its three electronic classrooms, as well as bring in external training events via teleconferences. Production requirements in the way of hourly production support will be needed for locally produced programs. It also will be necessary to develop instructional materials for locally produced workshops. Finally, external teleconferences often carry registration fees; funds identified will be used to cover these costs.

Copyright (c) 1994, Arlington Public Schools, VA

GOAL II

To enhance and improve the teaching and learning process through the effective use of instructional technology.

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.A. Provide collaborative support to principals and their staffs in the development and implementation of instructional technology plans at the building level.	1.	Begin hiring building based Instructional Technology Coordinators (ITCs).	FY 96 - ongoing	**$1,373,526 per year** 21 elementary school ITCs, five middle school ITCs, four high school ITCs, one for Jackson, one for H-B Woodlawn, and one shared among Langston, Hoffman-Boston, Family Center, and Wilson/REEP. Salary of $32,645 is based on the new BA+15, Step C, T-Scale as provided by the Finance Office with a fringe of $8,977 for a total of $41,622 per position. (These 33 positions are critical for any instructional technology expansion at the building/classroom instructional level. This number of ITCs assumes full implementation of the strategic plan and could be phased in over two years.)	All APS instructional technology focus groups and IMT staff identified full time building based Instructional Technology Coordinators (ITCs) as the critical foundation for successful program continuation and expansion at the school level. Research documents the need for readily accessible (i.e., during the instructional day) in-school training and technical support. These positions are essential for fully realizing the potential of integrating technology into student learning experiences, teaching practices, and the curriculum and for implementation of many objectives in this plan. (For an expanded discussion of supporting research, see research section 6.0 of this report.) The IMT management team believes that the vision embodied by this plan will be achieved effectively and efficiently with the integral support provided to teachers, students, and each school's learning community by full time school based ITCs.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.A. (continued) Provide collaborative support to principals and their staffs in the development and implementation of instructional technology plans at the building level.	2.	Serve on interview teams to select full-time building based ITCs.	FY 95 - ongoing	Supported with IMT staff.	Provided that building based ITCs are hired, IMT representatives should be part of interview teams given their expertise in instructional technology and their proposed supervisory responsibility for these new positions.
	3.	Provide on-site support to, supervision of, and leadership for the full-time building based Instructional Technology Coordinators (ITCs).	FY 95 - ongoing	Supported with IMT staff.	Instructional Technology Coordinators will be given supervisory support and ongoing training by IMT staff for purposes of instructional technology program coordination. Additionally, IMT staff will provide performance observations of ITCs upon request of the principal. (The relationship among IMT central office staff, principals, and ITCs will parallel current APS organizational structure.)
	4.	Recommend baseline instructional technologies distributed by the library media centers in the elementary, middle, and high schools.	FY 95	Supported with IMT staff.	Issues of instructional technology hardware and software equity emerged during technology focus group meetings. To resolve this equity issue, it is imperative that IMT establish some baseline instructional technology minimum hardware requirements for each school in Arlington County. Such baseline requirements will serve as the basis for initial future hardware purchases. Under Goal VII, Objective A, IMT proposes that schools receive funding which may be used to purchase baseline equipment.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.A. (continued) Provide collaborative support to principals and their staffs in the development and implementation of instructional technology plans at the building level.	5.	Develop a schedule, recommendations, and procedures for system-wide hardware replacement, software upgrades, and associated costs, including appropriate increases in school based technology funds.	FY 95 - FY 99	Supported with IMT staff.	Technology hardware replacement and software upgrades have become a problem in recent years as much of the instructional technology hardware exceeded its normal life expectancy several years ago. IMT will develop a schedule of obsolescence that addresses equipment replacement. Funding for this objective is specified under Goal III, Objective A and Goal VII, Objective A of this plan.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.B. Provide leadership in developing alternative instructional delivery systems.	1.	Transfer Distance Learning Specialist position from cable TV funds to APS operating budget.	FY 96 - ongoing	**$72,235** Distance Learning Specialist (salary - $56,655; benefits - $15,580).	The Distance Learning Specialist needs to be funded as a regular staff member of the IMT Department within the Division of Instruction. The position continues to be critical in developing and implementing distance learning and electronic classroom programs.
	2.	Provide a comprehensive distance learning program (elementary level through adult) through identification, design, implementation, and evaluation of curriculum, staff development activities, teleconferences, and electronic fieldtrips.	FY 95 - ongoing FY 96 - ongoing FY 97- ongoing	**$54,500** Teaching assistants ($34,600) and hourly technical support ($12,000) for three electronic classroom courses. Video tapes and supplies ($1,600), teacher training ($2,550), and curriculum development ($3,750). **$60,500** Ongoing costs ($54,500 - see FY 95); staff development ($6,000 to purchase and originate staff development teleconferences). **$82,700** Ongoing costs ($60,500 - see FY 96); one additional high school course ($14,200 - includes teaching assistants, tape stock, teacher training, and curriculum development); elementary electronic fieldtrips ($8,000).	APS already has invested significant expenditures to establish electronic classrooms at three high schools. It is imperative that a comprehensive distance learning program be developed to reap the full benefits of the investment. Additional courses will be identified for future delivery via this instructional technology. Plans include using the electronic classrooms for staff development activities. IMT will originate and receive national teleconferences and electronic fieldtrips that benefit students, staff, and the Arlington community. Additional funds are needed to establish the distance learning program as an integral and viable component of the APS instructional program.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.B. (continued) Provide leadership in developing alternative instructional delivery systems.	3.	Design and bring online additional interactive electronic classrooms and receive sites.	FY 96	**$69,000** Construction of H-B Woodlawn electronic classroom ($35,000 - CIP funded), computers, microphones, teacher station, laser disc ($30,000), student desks and chairs ($4,000).	The original distance learning plans called for H-B Woodlawn to be brought online and serve as the fourth site of APS' distance learning network. As funds are not available during FY95 to establish an electronic classroom at H-B, IMT proposes to do so in FY96, thus extending distance learning courses to H-B students. In addition, IMT will extend distance learning capabilities to the middle and elementary schools through interactive desktop video. This opens up possibilities for electronic field trips and Global Schoolhouse types of distance learning experiences. This project must continue into FY2000 and beyond until all elementary schools have send and receive capabilities.
			FY 97	**$65,000** Add send and receive capabilities for two middle schools (send equipment: video cameras, audio equipment, modulators, mounts, hardware and wiring - $30,000; receive equipment: $5,000, includes three to four large monitors per site with mounts and wiring) and send and receive capabilities for three elementary schools (send/receive equipment: desktop video - $30,000).	
			FY 98	**$65,000** Add send and receive capabilities for two middle schools (send equipment: video cameras, audio equipment, modulators, mounts, hardware and wiring - $30,000; receive equipment: $5,000, includes three to four large monitors per site with mounts and wiring) and send and receive capabilities for three elementary schools (send/receive equipment: desktop video - $30,000).	
			FY 99	**$57,500** Add send and receive capabilities for one middle school (send equipment: video cameras, audio equipment, modulators, mounts, hardware and wiring - $15,000; receive equipment: $2,500, including one or two large monitors per site with mounts and wiring) and send and receive capabilities for four elementary schools (send/receive equipment: desktop video - $40,000). (Note: Fund with bond monies or dedicated capital equipment replacement account.)	

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.B. (continued) Provide leadership in developing alternative instructional delivery systems.	4.	Develop and implement telecomputing distance learning systems (e.g., sending and receiving digitized/compressed video and audio via computer networks).	FY 95 FY 95 - 96 FY 96-ongoing	**(NSF/ Zenith Corporation funded)** Global Schoolhouse Project - one middle school and one elementary school. **$1,000** Internet Video Project - Peripherals and software funded in APS operating budget. (Balance of project beyond the $1,000 funded by ARPA / GMU / Community Learning Information Network.) **$40,000** **($10,000 per year for four years)** Continue partnership special initiatives through FY 99.	The field of distance learning is rapidly moving into a digital based format. Many such systems are now in place throughout the U.S. During FY 93, this format was used for the Global Schoolhouse Project that involved four sites around the U.S. and Great Britain, and included APS' Long Branch Elementary School. IMT will pursue partnerships in order to extend these kinds of projects to all APS schools. With seed monies and matching funds, IMT will have greater success in attracting partnerships and sustaining projects.
	5.	Hire a Distance Learning Instructional Development and Evaluation Specialist.	FY 97 - ongoing	**$61,276** One 12-month Distance Learning Instructional Development and Evaluation Specialist (salary: $48,060; benefits: $13,216).	The Distance Learning Instructional Development and Evaluation Specialist will assist in expanding the APS distance learning program. The specialist will be responsible for managing large scale instructional development distance learning projects, including performing needs analyses, assisting in the development of project objectives, translating content into media scripts, and conducting formative and summative evaluations for distance learning courses and projects.
	6.	Hire an Assistant Telecommunications Engineer.	FY 97 - ongoing	**$58,379** Assistant Telecommunications Engineer (salary - $45,788; benefits - $12,591).	The Assistant Telecommunications Engineer will support the growth of new and existing audio, video, and digital based instructional technologies in APS. Functions include maintaining instructional communications systems, R.F. cable, fiber optic, satellite, and associated equipment. This specialist also will install and service digital, analog, video, audio, and data communications equipment. This position will be assigned to ETV.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
II.C. Provide collaborative support to Curriculum Supervisors, Vocational, Technical, and Special Education Program Coordinators, and their immediate staff and teachers in the development and implementation of instructional technology plans at the department/ discipline level.	1.	Provide discipline-based IMT grants for purchasing instructional technology hardware, software, and training services.	FY 96 - ongoing	**$100,000 annual** Grants will be used to support special curriculum based instructional technology initiatives for elementary, middle, and high schools	Curriculum supervisors and program coordinators will be awarded grants which allow them to assume leadership in developing innovative uses of instructional technology in all elementary and secondary curricular areas. These grants would be administered and awarded annually by the IMT department through a formal grant proposal process.

Copyright (c) 1994, Arlington Public Schools, VA

GOAL III.

To infuse and integrate all forms of instructional technology into all aspects of the Arlington Public Schools instructional program.

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. Provide all students and staff with updated instructional technology hardware and software.	1.	Hire a Computer Systems Specialist.	FY 95	**$61,276** Computer Systems Specialist (salary - $48,060; benefits - $13,216) (Propose upgrading clerk position in Academic Computing)	The Computer Systems Specialist will provide timely support services to school and curriculum staff. Responsibilities will include computer systems trouble shooting, identifying hardware/software specifications/compatibility for purchasing decisions, and performing hardware/software installations.
	2.	Replace obsolete classroom and lab computer systems in all high schools (this includes Academic Computing and Vocational Education purchased systems).	FY 96 FY 97 FY 98 FY 99	**$400,000** Replace 160 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$412,500** Replace 165 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$300,000** Replace 120 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$350,000** Replace 140 systems. (Bond funds or dedicated capital equipment replacement account funds.) (No additional costs for installation and training contingent upon full-time ITCs being hired.)	In FY95, 585 high school systems will be obsolete (i.e., unreliable, incapable of running high quality sophisticated instructional software, and/or replacement parts are no longer available). This situation will deteriorate further in FY96 and beyond if not attended to immediately.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	3.	Replace middle school general use and business use computer labs.	FY 96 FY 97 FY 98 FY 99	**$362,500** Replace 145 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$262,500** Replace 105 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$262,500** Replace 105 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$237,500** Replace 95 systems. (Bond funds or dedicated capital equipment replacement account funds.) (No additional costs for installation and training contingent upon full-time ITCs being hired.)	As of FY94, 450 middle school systems are obsolete (i.e., unreliable, incapable of running high quality sophisticated instructional software, and/or replacement parts are no longer available). This situation will deteriorate further in FY96 and beyond if not attended to immediately.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	4.	Replace elementary school general use and program use computer systems in labs and/or classrooms.	FY 95 FY 96 FY 97 FY 98 FY 99	**$70,000** Replace 28 systems (FY95 Superintendent's Technology Initiative funds) **$925,000** Replace 370 systems (20 systems per 18 existing elementary schools; 10 at Jackson). (Bond funds or dedicated capital equipment replacement account funds.) **$375,000** Replace 150 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$275,000** Replace 110 systems. (Bond funds or dedicated capital equipment replacement account funds.) **$275,000** Replace 110 systems. (Bond funds or dedicated capital equipment replacement account funds.) (No additional costs for installation and training contingent upon full-time ITCs being hired.)	As of FY94, 548 elementary school computer systems are obsolete (i.e., unreliable, incapable of running high quality sophisticated instructional software, and/or replacement parts are no longer available). An additional 220 systems are approaching obsolescence. This situation will deteriorate further in FY96 and beyond if not attended to immediately.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	5.	Purchase teaching/productivity laptop computers for all APS teachers.	FY 96 - ongoing	**$765,000** 250 laptops per year and training (hardware - -$700,000); 4 substitute days per teacher for training ($65,000 training per year). (Fund hardware with bond funds or a dedicated capital equipment replacement account.) (Total cost through FY 99: $3,060,000)	IMT focus groups recommended that teachers be issued computers to increase their productivity and to enhance the delivery of instruction. Computers also provide teachers with a communication link to other teachers (e.g., VA.PEN and the National Information Infrastructure --NII). Research indicates that student use increases and becomes more sophisticated when teachers become frequent users of computers for productivity and instructional delivery (see Research Section 6.0). This project will need to be continued through FY 2000 at an additional cost of $765,000.
	6.	Purchase additional and replace existing conventional classroom AV/TV equipment.	FY 95 FY 96 - ongoing	**$126,000** Purchase additional overheads, VCRs, TV carts, video recorders, lights, tripods. (Covered by FY 95 Baseline and Superintendent's technology initiative funds.) **$150,000** Purchase additional overheads, VCRs, TV carts, video recorders, and other AV and TV equipment (Recommend increasing planning factors or fund through dedicated capital equipment replacement account.) Total five year cost: $726,000.	These funds will allow IMT to replace conventional classroom AV/TV equipment, much of which has been in use 7 to 15 years beyond life expectancy. Some of the units were purchased in the 1960's and have become obsolete due to the lack of available parts. When service is required, they must be repaired with parts cannibalized from unusable equipment. When equipment is beyond repair it must be scrapped, leaving classrooms without necessary instructional tools.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	7. Hire a Computer Repair Technician.	FY 96 - ongoing	**$39,726** Computer Repair Technician (M15-16 scale salary: $31,158; benefits: $8,568).	An additional computer repair technician is essential to provide repair support for instructional computing systems purchased by IMT, schools, and central office Curriculum Supervisors. This person will be assigned to TMC technical staff, which currently is experiencing difficulties meeting ongoing repair needs.
	8. Upgrade central IMT TV and graphics production equipment and maintenance facilities providing services to classrooms teachers and staff.	FY 96 FY 97 FY 98 FY 99	**$105,000** Video production and master control equipment, including monitors, VCRs, and control devices ($70,000). Graphics production equipment and devices for creating classroom materials ($20,000). Maintenance diagnostic equipment and specialized tools for service of AV/TV equipment and computer systems ($15,000). **$50,000** Spectrum analyzer for cable TV testing ($25,000). TV/Graphics/Maintenance equipment needs ($25,000). **$25,000** Ongoing Costs -TV/Graphics/ Maintenance equipment needs. **$45,000** Digital network test equipment ($20,000) plus TV / graphics / maintenance equipment ongoing costs ($25,000). (Note: Fund all hardware with dedicated capital equipment replacement account fund.)	Many of these items are part of the original TV studio installation and are at least 15 years old. Computer based systems are reaching obsolescence and require continual maintenance. Increasing sophistication of school based instructional technology equipment requires technical staff to have access to equally sophisticated diagnostic equipment.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	9.	Upgrade TV programming, distribution, recording/mastering systems.	FY 95	**$26,000** Beta dubbing VCR and satellite receive dish for Career Center (Superintendent's Technology Initiative)	The present satellite receive dish is unreliable, resulting in the need for frequent maintenance and repair. In addition, the video industry is beginning to phase out the 3/4" format for mastering (recording) original TV productions. Purchase of the digital dubbing VCR will allow APS to begin phasing in the new 1/2" digital broadcast quality Beta industry standard.
			FY 96	**$82,400** Phase I of implementation of new automated VCR cable programming, distribution, and mastering system. Flexicart system consisting of mechanical box trays to hold VCRs, servo motor, and computer software ($45,000). Two VCRs found inside flexicart mechanical box ($25,000) and two VCRs for limited off-air recording and dubbing ($12,400).	The Flexicart system replaces Q-Star equipment that is obsolete and is no longer manufactured and supported. The Flexicart system will control instructional and informational cable programming for APS.
			FY 97	**$30,900** Phase II of implementation of new automated VCR cable programming, distribution and mastering system. Two additional VCRs for expanded off-air recording and dubbing ($12,400). Editing playback capabilities for off-air recording and dubbing ($11,500). Playback VCR for editing ($7, 000).	
			FY 98	**$23,700** Phase III of implementation of new automated VCR cable programming, distribution, and mastering system. VCR for studio production ($6,200). A second editing/recording VCR ($17,500). (Recommend funding with dedicated capital equipment replacement account).	

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
III.A. (continued) Provide all students and staff with updated instructional technology hardware and software.	10.	Purchase television equipment for mobile van.	FY 97 FY 98	**$40,000** Two television cameras, cables, tripods,/dollies, VCRs, remote switcher. (Fund with dedicated capital equipment replacement account.) **$40,000** Character generator, additional camera, cables, and tripod/dolly, camera control unit, and audio equipment. (Fund with dedicated capital equipment replacement account.)	Equipping the mobile van will provide APS with the capability to offer electronic fieldtrips to elementary/middle schools. It also will provide additional distance learning sites, backup equipment for School Board meetings, and the capability to produce remote on-site instructional video segments for classroom use.

GOAL IV.

To train teachers and other instructional staff to become capable users of technology for instructional delivery, information access, and personal productivity.

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
IV.A. Provide a comprehensive school based instructional technology staff development program	1.	ITCs develop, conduct, and evaluate instructional technology school based training.	FY 96 - ongoing	**$78,000 per year** Substitute time for classroom teachers (1,200 substitute days [at one day per teacher] x $65 per day = $78,000)	IMT instructional technology focus group participants advocated both the hiring of ITCs and site based technology training offered on an ongoing basis by these individuals. Because of the limited number of central staff assigned training responsibilities, and because these individuals also have numerous other responsibilities (e.g. equipment installation, maintenance, software installation, etc.), for technology to have a real impact, ITC school based training is essential.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
IV.B. Provide a comprehensive <u>system-wide</u> instructional technology staff development program.	1.	Maintain the instructional portion of the Technology Demonstration Lab/Materials Preview and Evaluation Center. (This room will be shared with Information Systems and used by IMT as a training center for two years.)	FY 95 FY 96 - ongoing	Facility staffed on an ad hoc basis by IMT staff. **<u>$8,000</u>** New technology equipment for the lab. Facility staffed by Instructional Technology Training Specialist in FY96. As of FY97, facility staffed by Instructional Materials Specialist.	The demonstration lab, created in FY94, will have multiple uses for the five-year period of the instructional plan as outlined in this document, especially during FY95 and FY96. During those two years, IMT proposed that it should serve as a site for demonstrating innovative applications of technology, a shared training facility with Information Systems, and an instructional materials preview and evaluation center. If the full training component of the five-year plan is approved, the lab will continue offering these services, but IMT <u>training</u> would originate from a proposed Multimedia Training Center.
	2.	Develop formal training program to include training topics, locations, incentives, and responsibilities for IMT, Curriculum Supervisors, Library Media Specialists, and building based ITCs.	FY 95 - ongoing	Supported with current staff and Training Specialist.	The development of a formal training program must occur if APS hopes to realize any appreciable instructional technology impact on its instructional programs. The plan, which must be updated annually, will include timely and relevant topics, participant incentives, and delegation of training responsibilities.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
IV.B. (continued) Provide a comprehensive system-wide instructional technology staff development program.	3.	Hire a 12-month Training Specialist to deliver, oversee, and coordinate instructional technology training.	FY 96 - ongoing	**$59,782** Salary for 12-month Training Specialist ($46,888; Benefits $12,894).	To support instructional staff in using current and future instructional technologies, APS must have a 12-month position that focuses only on training support. This person will provide training to ITCs and classroom teachers, and will introduce instructional staff to new and emerging technologies.
	4.	Create, maintain, and staff a central Multimedia Training Center.	FY 97 FY 98-ongoing	**$114,000** Purchase hardware, software ($90,000), and lease training facility space ($24,000 per year). **$24,000 per year** Lease training facility space.	Training is essential if APS expects its teaching staff to use technology as both a productivity tool and tool for enhancing the teaching/learning process. Researchers conclude student use increases and becomes more sophisticated when teachers become capable users. A dedicated facility for full scale multimedia training is needed based on the goals proposed in this plan. The Technology Demonstration Lab temporarily will be used for some on-going training until a dedicated Multimedia Training Center is established. The original intent for the lab was to serve as a place to investigate innovative applications of technology. IMT plans to use the demonstration lab as a place to preview and evaluate instructional materials. Finally, given the shared use of the demonstration lab with Information Systems, an additional dedicated training facility is needed as technology use grows over the next five years and beyond.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
IV.B. (continued) Provide a comprehensive system-wide instructional technology staff development program.	5.	Hire an Instructional Materials Specialist (assumes responsibility for Technology Demonstration Lab / Materials Preview and Evaluation Center as Training Specialist moves to central Multimedia Training Center).	FY 97 - ongoing	**$59,782** Twelve month staff member for a Technology Demonstration Lab / Materials Preview Center (salary $46,888; benefits $12,894).	The Instructional Materials Specialist will coordinate the various services provided by the Technology Demonstration Lab, including preview and evaluation of instructional materials, and assisting curriculum staff, librarians, teachers, students, and citizens in using instructional technology hardware and software.
	6.	Provide regular funding to keep the central Multimedia Training Center current.	FY 98 - ongoing	**$20,000 per year** Upgrade equipment, software, and ancillary materials.	IMT feels strongly that a facility dedicated to technology training should feature up-to-date instructional media and technology.
	7.	Offer system-wide training by IMT staff.	FY 96 - ongoing	**$30,000 per year** Substitute time (400 days x $65 per day = $26,000) for classroom teachers; pay for after hours workshops and consultants ($4,000).	IMT staff will provide system-wide training on widely used software (e.g., databases, word processing, graphics) and on software for special projects with focused applications. Additionally, IMT staff will emulate the state model of "training the trainers." This training will increase, as it must, provided a Multimedia Training Center and full-time trainers are added to the staff.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
IV.B. (continued) Provide a comprehensive system-wide instructional technology staff development program.	8.	Offer, through a lending library, individualized tutorial programs for staff development via audio, video, print, and electronic media (e.g. videotape, videodiscs, computer software).	FY 95 - ongoing	**$2,500 per year** Purchase of materials (funded with existing IMT operating budget)	IMT instructional technology focus group participants advocated individualized, self-instructional media programs as one of many methods to teach the use of various instructional technologies. To provide APS staff with this form of training, a relatively small amount of money has been identified from IMT operating funds to purchase mediated materials for a training lending library.
	9.	Purchase outside training services as needed.	FY 96 - ongoing	**$10,000** External trainers and training.	There are instances when outside consultants must be brought in to conduct specialized forms of technology training. In other instances, IMT staff, including Library Media Specialists and ITCs benefit from external technology workshops in which they acquire new job related technology skills.
IV.C. Facilitate the delivery of Division of Instruction, Vocational, Technical, and Special Education staff development through instructional technology.	1.	Use distance learning technologies to offer training in support of Curriculum Supervisors, Specialists, Vocational, Technical, and Special Education professionals in the delivery of their content based staff development.	FY 96 - ongoing	**$3,000** 200 hours of technical/production support	To fully utilize APS' distance learning capabilities, such technologies should be used to enhance staff development opportunities for all instructional programs. Since IMT will offer some of these staff development programs using distance learning technologies, hourly technical and production support will be needed.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

GOAL V.

To support selection and effective use of appropriate instructional media and technology.

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
V.A. Establish a Materials Preview and Evaluation Center for instructional media and technology. **(Note: This center initially will be housed in the Technology Demonstration Lab.)**	1.	Develop a process for continual preview, evaluation, and selection of instructional media (e.g. computer software, videotapes, videodiscs, CD-ROM disks).	FY 95	Supported by current staff.	To provide for preview, evaluation, selection, and acquisition of instructional media and technology software. A center, located in the Technology Demo Lab, will be accessed by curriculum staff, teachers, librarians, and the community. Vendors will be sought who are willing to provide materials at no cost.
	2.	Implement the Materials Preview and Evaluation Center.	FY 96 - ongoing	**$5,000** Preview charges for instructional media materials. Maintenance of information system and CD-ROM subscriptions.	(See above)
	3.	Procure district-wide media licenses and assist schools in obtaining site licenses.	FY 95 - ongoing FY 96 - ongoing	**$7,500** Budgeted in current Academic Computing operating funds for one system wide computer software license. **$39,000** Licenses for Academic Computing, Distance Learning, and Teaching Materials Projects.	System licensing increases cost effectiveness and decreases the need to negotiate individual site licenses. System licenses also ensure copyright compliance. The increase from FY95 to FY96 expands licenses to include multimedia and distance learning.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

GOAL VI.

To provide appropriate leadership to support effective information access and connectivity.

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
VI.A. Develop a technology information distribution infrastructure to support internal and external connectivity for the improvement of information access and instructional delivery.	1.	Hire a consultant to develop a plan to provide Arlington Schools with a voice, data, and video networking infrastructure.	FY 95 FY 96	**$10,000** Consultant fees to develop plan and bid specifications. **$5,000** Consultant retained to provide consultation with IMT, Facilities, and Information Systems staff.	Due to the technical complexities of the infrastructure, independent consultant services are required to develop a comprehensive networking plan and bid specifications. This project will require at least two years of consultant services.
	2.	Add an Instructional Networking Specialist to the IMT staff.	FY 96 - ongoing	**$64,159** Salary for 12-month Instructional Networking Specialist (salary - $50,321; benefits - $13,830).	To enable IMT to provide data and video networking for all classrooms, it is necessary to hire a full-time Instructional Networking Specialist to design, manage the installation, and maintain the networks. The specialist will serve as a liaison from IMT to Information Systems and Facilities Planning.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES	ACTION STEPS		IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
VI.A. (continued) Develop a technology information distribution infrastructure to support internal and external connectivity for the improvement of information access and instructional	3.	Network all classrooms to libraries for data and video, and establish a district infrastructure for central distribution, on demand, of instructional media and for computer connectivity.	FY 96 - FY 99	**$852,617 per year** Network approximately one fourth of the classrooms for video, data, and multimedia. (This figure does not include telephone service. **Note: $3,410,470 (approx. total cost)** To include voice (telephones) an additional $932,750 is needed. Pages 43 - 52 contain a complete breakdown of costs and a narrative description for video, data, and multi-media networking. A breakdown of telephone networking costs is also included.	The majority of APS require cable distribution system upgrades. This is due to the advanced age of many systems resulting in reliability and signal problems. Networking all classrooms to the library will enable teachers to access all forms of technology (CD-ROMs, laser discs, video tape) from the Library Media Center. This will provide for improved management and utilization of the media as well as expanded access to satellite programming and other external instructional programs. Finally, proposed distance learning, desktop video initiatives, and central media distribution systems at the elementary and middle school levels require such networking. (This action step will need to continue into FY2000.)

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Video and Data Networking

Buildings	Building Data			Analog Video Network		Computer & Data Digital Network		Total Costs
	Class Rooms	Other Rooms	Total Rooms	Basic Video Equipment and Wiring ($190 x total rooms)	Upgraded Video Equipment and Wiring ($250 x classrooms)	Data Wiring (within a building) ($660 x classrooms)	Data Distribution Equipment ($1500 x classrooms)	including Basic Video, Upgraded Video, Data Wiring, Data Dist Equip
Elementary								
Abingdon	46	5	51	$9,690	$11,500	$30,360	$69,000	$120,550
Ashlawn	25	3	28	$5,320	$6,250	$16,500	$37,500	$65,570
Barcroft	34	3	37	$7,030	$8,500	$22,440	$51,000	$88,970
Barrett	13	2	15	$2,850	$3,250	$8,580	$19,500	$34,180
Claremont	26	3	29	$5,510	$6,500	$17,160	$39,000	$68,170
Drew	30	3	33	$6,270	$7,500	$19,800	$45,000	$78,570
Glebe	29	3	32	$6,080	$7,250	$19,140	$43,500	$75,970
Glencarlyn	33	3	36	$6,840	$8,250	$21,780	$49,500	$86,370
Henry	27	3	30	$5,700	$6,750	$17,820	$40,500	$70,770
Jackson	30	3	33	$6,270	$7,500	$19,800	$45,000	$78,570
Jamestown	26	3	29	$5,510	$6,500	$17,160	$39,000	$68,170
Key	42	4	46	$8,740	$10,500	$27,720	$63,000	$109,960
Long Branch	33	3	36	$6,840	$8,250	$21,780	$49,500	$86,370
McKinley	26	3	29	$5,510	$6,500	$17,160	$39,000	$68,170
Nottingham	22	2	24	$4,560	$5,500	$14,520	$33,000	$57,580
Oakridge	44	4	48	$9,120	$11,000	$29,040	$66,000	$115,160
Page	21	2	23	$4,370	$5,250	$13,860	$31,500	$54,980
Randolph	41	4	45	$8,550	$10,250	$27,060	$61,500	$107,360
Reed	27	3	30	$5,700	$6,750	$17,820	$40,500	$70,770
Taylor	38	4	42	$7,980	$9,500	$25,080	$57,000	$99,560
Tuckahoe	27	3	30	$5,700	$6,750	$17,820	$40,500	$70,770
Elementary Totals	640	66	706	$134,140	$160,000	$422,400	$960,000	$1,676,540

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Video and Data Networking

Buildings	Building Data			Analog Video Network		Computer & Data Digital Network		Total Costs
	Class Rooms	Other Rooms	Total Rooms	Basic Video Equipment and Wiring ($190 x total rooms)	Upgraded Video Equipment and Wiring ($250 x classrooms)	Data Wiring (within a building) ($660 x classrooms)	Data Distribution Equipment ($1500 x classrooms)	including Basic Video, Upgraded Video, Data Wiring, Data Dist Equip
Middle School								
Gunston	54	5	59	$11,210	$13,500	$35,640	$81,000	$141,350
Jefferson	73	7	80	$15,200	$18,250	$48,180	$109,500	$191,130
Kenmore	50	5	55	$10,450	$12,500	$33,000	$75,000	$130,950
Swanson	45	5	50	$9,500	$11,250	$29,700	$67,500	$117,950
Williamsburg	61	6	67	$12,730	$15,250	$40,260	$91,500	$159,740
Middle Totals	283	28	311	$59,090	$70,750	$186,780	$424,500	$741,120
High School								
Wakefield	100	10	110	$20,900	$25,000	$66,000	$150,000	$261,900
Washington-Lee	90	9	99	$18,810	$22,500	$59,400	$135,000	$235,710
Yorktown	70	7	77	$14,630	$17,500	$46,200	$105,000	$183,330
H-B Woodlawn	35	4	39	$7,410	$8,750	$23,100	$52,500	$91,760
Career Center	43	4	47	$8,930	$10,750	$28,380	$64,500	$112,560
High School Totals	338	34	372	$70,680	$84,500	$223,080	$507,000	$885,260

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Video and Data Networking

Buildings	Building Data			Analog Video Network		Computer & Data Digital Network		Total Costs
	Class Rooms	Other Rooms	Total Rooms	Basic Video Equipment and Wiring ($190 x total rooms)	Upgraded Video Equipment and Wiring ($250 x classrooms)	Data Wiring (within a building) ($660 x classrooms)	Data Distribution Equipment ($1500 x classrooms)	including Basic Video, Upgraded Video, Data Wiring, Data Dist Equip
Other								
Hoffman-Boston	18	2	20	$3,800	$4,500	$11,880	$27,000	$47,180
Langston	12	2	14	$2,660	$3,000	$7,920	$18,000	$31,580
Wilson	11	1	12	$2,280	$2,750	$7,260	$16,500	$28,790
Other Totals	41	5	46	$8,740	$10,250	$27,060	$61,500	$107,550
Grand Totals	1302	133	1435	$272,650	$325,500	$859,320	$1,953,000	$3,410,470

Copyright (c) 1994 Arlington Public Schools, VA

EXPLANATION OF THE SUMMARY OF WIRING COSTS FOR VIDEO DATA NETWORKS CHART, "ANALOG VIDEO DISTRIBUTION" COLUMN

The proposed video system infrastructure is listed at two levels. The first level, "Basic Video," will give regular cable services to each classroom with *limited* in-house distribution capabilities. Satellite, if available, can be distributed in-house, however, no distance learning applications or teacher control would be available.

The second level, "Upgraded Video," brings a variety of additional capabilities and benefits. An internal distribution network of channels will be set up in each school. The number of channels per school will vary depending on need and size. A basic formula of 8-10 classrooms per channel was used for these estimates. A formal survey of video use in the schools will be required to ascertain requirements for each school.

Implementation of the second level, "Upgraded Video" will allow centralized video distribution systems within the schools. An obvious benefit is avoiding installing one VCR in every classroom. Another is easier and more consistent adherence to copyright laws. A less obvious benefit is the way centralized distribution enables new video formats and sources to be brought into *every* classroom with minimal investment. Even if well-utilized, equipment in the classroom sits unused some of the time, when multiplied by over 1300 classrooms district-wide, the amount of idle equipment is substantial. Rather than purchasing new video media or technologies for each classroom, equipment will be purchased for one location.

As specified, teachers will have full remote operation of video media via standard remote controls, much as they have now. Scheduling can be accomplished from the classroom using the phone (this assumes that a phone will be available in each classroom) or, with computer resources, scheduling can be entered directly. Computer scheduling represents the first step in the integration of video and data technologies.

Internal networks also will enhance the current distance learning system. Portable, on demand, distance learning or teleconferencing can be brought into any classroom in a school connected to the current distance learning network. A portable system of this nature will have limited capabilities but will allow students not attending distance learning classrooms, to participate in electronic fieldtrips or special projects. The value of this capability will grow as more schools are connected to the distance learning network. Whether this expansion occurs from the existing cable system or from one of the competing systems is irrelevant; the infrastructure to interface the schools to the outside world will be in place.

Copyright (c) 1994, Arlington Public Schools, VA

The benefits of combining the "Basic Video" and "Upgraded Video" options in combination are summarized below:

- centralized video media distribution, allowing easier compliance with copyright laws
- eliminating a VCR / laserdisc in every classroom, reducing servicing and replacement costs
- remote control of video programs from the classroom
- scheduling of in-house programming from the classroom
- distance learning hook-ups from any classroom
- direct satellite reception in each classroom for those schools with satellite dishes
- basic cable TV reception in each classroom.

Included in the "Basic Video" subcolumn are costs to purchase and install:

- single coax wiring
- distribution equipment
- junctions, connections and conduit as needed for wiring.

(Note: Totals are based on $190 per classroom.)

Included in the "Upgraded Video" subcolumn are costs to purchase and install:

- additional coax wiring (dual lines)
- distribution equipment, modulators, amplifiers
- remote interface electronics
- junctions, connections and conduit as needed for wiring.

(Note: Totals are based on $250 per classroom.)

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

EXPLANATION OF THE SUMMARY OF WIRING COSTS FOR VIDEO & DATA NETWORKS CHART, "COMPUTER DATA DIGITAL NETWORK" COLUMN

The "Computer Data Digital Network" column provides estimates for the infrastructure required for installation of digital data networks within the schools. These estimates were based on the number of classrooms in each building. School buildings will receive the distribution equipment and wiring required to allow any interfaced computer to communicate with all other interfaced computers in the classroom, in the building, and in remote locations.

The proposed infrastructure for data communication will be flexible. By wiring the building and all classrooms, capabilities are built in to meet rapidly changing technology needs. This network configuration also will enhance current and future distance learning projects. With the necessary interfaces, both the proposed video distribution system and current distance learning equipment can be integrated into the digital network. The merging of these technologies in combination with the existing electronic classroom analog video distribution system will facilitate implementation of "desktop" distance learning in the elementary schools.

Computer and video networking provide:

- a network within each classroom, allowing computers within the room to share data
- a building-wide network infrastructure, connecting all classrooms so that any classroom within the school can share data with any other classroom(s)
- a data path for connecting computers on a building-wide basis to utilize common, centralized connection points to the outside world, resulting in shared use of outside data lines with less redundancy
- networking to enable centralized distribution of data, including CD-ROM information.

Included in the "Data Distribution Equipment" subcolumn are costs to purchase and install:

- distribution equipment for the digital network wiring within each classroom
- distribution equipment for the main digital network wiring and wiring closets.

(Note: Costs are estimated for equipment required to operate medium capacity, category 3 wiring; totals are based on $1,500 per classroom.)

Copyright (c) 1994, Arlington Public Schools, VA

Included in the "Data Wiring" subcolumn are costs to purchase and install:

- twisted pair wiring
- junctions, connections, and conduit as needed for wiring

(Note: Costs quoted are as supplied by the Office of Facilities Planning; these items do not include distribution of terminal equipment; totals are based on $650 per classroom.)

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Telephones

Buildings	Building Rooms			Telephone Wire * and Distribution Equipment ($650 x total rooms)
	Class Rooms	Other Rooms	Total Rooms	
Elementary				
Abingdon	46	5	51	$33,150
Ashlawn	25	3	28	$18,200
Barcroft	34	3	37	$24,050
Barrett	13	2	15	$9,750
Claremont	26	3	29	$18,850
Drew	30	3	33	$21,450
Glebe	29	3	32	$20,800
Glencarlyn	33	3	36	$23,400
Henry	27	3	30	$19,500
Jackson	30	3	33	$21,450
Jamestown	26	3	29	$18,850
Key	42	4	46	$29,900
Long Branch	33	3	36	$23,400
McKinley	26	3	29	$18,850
Nottingham	22	2	24	$15,600
Oakridge	44	4	48	$31,200
Page	21	2	23	$14,950
Randolph	41	4	45	$29,250
Reed	27	3	30	$19,500
Taylor	38	4	42	$27,300
Tuckahoe	27	3	30	$19,500
Elementary Totals	640	66	706	$458,900

* Data provided by Facilities Staff

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Telephones

Buildings	Building Rooms			Telephone Wire * and Distribution Equipment ($650 x total rooms)
	Class Rooms	Other Rooms	Total Rooms	
Middle School				
Gunston	54	5	59	$38,350
Jefferson	73	7	80	$52,000
Kenmore	50	5	55	$35,750
Swanson	45	5	50	$32,500
Williamsburg	61	6	67	$43,550
Middle Totals	283	28	311	$202,150
High School				
Wakefield	100	10	110	$71,500
Washington-Lee	90	9	99	$64,350
Yorktown	70	7	77	$50,050
H-B Woodlawn	35	4	39	$25,350
Career Center	43	4	47	$30,550
High School Totals	338	34	372	$241,800

* Data provided by Facilities Staff

Copyright (c) 1994 Arlington Public Schools VA

APS Instructional Technology Strategic Plan
Summary of Wiring Costs for Telephones

Buildings	Building Rooms			Telephone Wire * and Distribution Equipment ($650 x total rooms)
	Class Rooms	Other Rooms	Total Rooms	
Other				
Hoffman-Boston	18	2	20	$13,000
Langston	12	2	14	$9,100
Wilson	11	1	12	$7,800
Other Totals	41	5	46	$29,900
Grand Total	1302	133	1435	$932,750

* Data provided by Facilities Staff

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
VI.A. (continued) Develop a technology information distribution infrastructure to support internal and external connectivity for the improvement of information access and instructional delivery.	4.	Explore, in conjunction with other community agencies, applications of instructional technology to extend and enhance communication among APS staff, parents, local businesses, and libraries (e.g. Homework Hotline, video-on-demand)	FY 96 - ongoing	**$10,000** Matching funds to secure new partnership initiatives	All public schools need to improve communications with constituents, including parents, local businesses, government and libraries. Opportunities often occur where partnerships can be arranged between APS and community agencies, and through the use of technology, communication links can be established. In some instances, APS matching funds are required to secure a partnership. The funds proposed would make the establishment of such partnerships requiring matching funds viable.

Copyright (c) 1994 Arlington Public Schools, VA

GOAL VII.

To assist schools in meeting their instructional media and technology hardware, software, training, and internal support needs through the procurement of an appropriate level of funding.

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
VII.A. Support significantly increased allocations of school based funds for purchasing IMT approved new and replacement instructional technology hardware, software, and materials.	1.	Increase school based computer equipment funding based on planning factor revisions.	FY 95	**$85,000** $5 per student for computer hardware.	This planning factor increase was approved by the School Board to enable school based increases in computer hardware purchases.
	2.	Change name of school budget accounts from "Computer Equipment" (acct 262-6528) to "Instructional Technology Equipment", and increase planning factor funding	FY 96 FY 97 FY 98 - ongoing	**$262,500** $15 per student (17,500 students) **$360,000** $20 per student (18,000 students) **$450,000** $25 per student (18,000 students)	This planning factor increase would allow schools to fund new instructional technology initiatives that meet the schools' instructional goals. This has been formally requested by principals through FY 95 new resources requests, and through focus group input.

Copyright (c) 1994, Arlington Public Schools, VA

OBJECTIVES		ACTION STEPS	IMPLEMENT DATES	APPROXIMATE COSTS	RATIONALE
VII.B. Develop and implement a plan for securing external funding for county wide instructional technology projects.	1.	Research and identify potential sources of external funding including federal and private foundation grants, and public and private partnerships.	FY 95 - ongoing	**$3,000** To secure the services of a grant writer, hired by the Division of Instruction, to draft an instructional technology grant proposal.	It has become evident to IMT management that external funds including federal and private foundation grants, and public and private partnerships are necessary if adequate funds are to be found to support a viable instructional technology program. IMT plans to research and identify such external funding sources. Where potential grants are identified, IMT will request support from Division of Instruction funds to purchase the services of a consultant grants writer.
	2.	Identify IMT produced instructional products and services that can be sold to external school systems, and other educational institutions including distance learning courses, instructional video productions, print media, CD-ROM instructional materials, electronic fieldtrips, and teleconferences	FY 95 - ongoing	Supported with current staff	Although public school systems are not established for purposes of selling instructional products and services, there are instances where the sale of such products and services are a natural outgrowth of the program and are also beneficial to other school systems. As IMT refines its distance learning courses, and instructional media and technology products and services, IMT management recommends the marketing of these items thus generating potential revenue that could be used to underwrite additional instructional technology based initiatives.
	3.	Develop and implement a marketing plan	FY 95 - ongoing	Supported with current staff	A plan will identify potential customers as well as strategies to reach them. It will also identify criteria for selecting those products and services IMT produces and provides, that might be marketed externally.

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Costs associated with implementing each of the goals, objectives and action steps of the APS Instructional Technology Strategic Plan are outlined on the next four pages

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

Copyright (c) 1994, Arlington Public Schools, VA

4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
I A Library Automation	1 Catalog	74,000	100,300	86,000	---	56,000	65,000	---	110,000	87,000	---	110,000	87,000	---	---	---	775,300
	2 Circulation	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	3 Bibliographic Utilities	---	---	---	---	---	---	---	---	6,000	---	---	10,500	---	---	16,000	32,500
	4 Acquisitions	---	---	---	---	---	---	---	---	---	---	3,000	1,000	---	---	1,000	5,000
	5 Automation Analyst	---	---	---	54,245	---	---	54,245	---	---	54,245	---	---	54,245	---	---	216,980
		74,000	100,300	86,000	54,245	56,000	65,000	54,245	110,000	93,000	54,245	113,000	98,500	54,245	---	17,000	1,029,780
I B External Information Access	1 Develop Automation Policies	---	---	---	---	---	28,300	---	---	28,300	---	---	28,300	---	---	28,300	113,200
	2 Access Internet etc	---	---	---	---	---	12,000	---	---	14,000	---	---	28,000	---	---	34,000	88,000
	3 BBS Access	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	25,000
	4 Expand DL Services	---	---	12,000	---	---	15,000	---	---	20,000	---	---	20,000	---	---	20,000	87,000
		---	---	17,000	---	---	60,300	---	---	67,300	---	---	81,300	---	---	87,300	313,200
II A School Level Support	1 ITCs	---	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	5,494,104
	2 Interview Teams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	3 On-Site Support	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	4 Baseline Recommendations	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	5 Replacement Schedule	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		---	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	1,373,526	---	---	5,494,104
II B Alternate Delivery Systems	1 DL Specialist	---	---	---	72,235	---	---	72,235	---	---	72,235	---	---	72,235	---	---	288,940
	2 DL Program	46,600	---	7,900	46,600	---	13,900	60,800	---	28,100	60,800	---	28,100	60,800	---	28,100	381,700
	3 Add Electr Classrooms	---	---	---	---	30,000	39,000	---	65,000	---	---	65,000	---	---	57,500	---	256,500
	4 Distance Learning System	---	1,000	---	---	1,000	10,000	---	1,000	10,000	---	1,000	10,000	---	1,000	10,000	45,000
	5 DL Inst Dev Specialist	---	---	---	---	---	---	61,276	---	---	61,276	---	---	61,276	---	---	183,828
	6 Telecom Engineer	---	---	---	---	---	---	58,379	---	---	58,379	---	---	58,379	---	---	175,137
		46,600	1,000	7,900	118,835	31,000	62,900	252,690	66,000	38,100	252,690	66,000	38,100	252,690	58,500	38,100	1,331,105

* Personnel includes salaried, hourly, full-time, and part-time positions

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

FILE: P-COMB-6.XLS 4/24/94 1

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
II C	1 Grants	---	---	---	---	50,000	50,000	---	50,000	50,000	---	50,000	50,000	---	50,000	50,000	400,000
Supervisor Support																	
III A	1 Comp Sys Specialist	61,276	---	---	61,276	---	---	61,276	---	---	61,276	---	---	61,276	---	---	306,380
Hardware	2 Replace HS computers	---	---	---	---	400,000	---	---	412,500	---	---	300,000	---	---	350,000	---	1,462,500
Software	3 Replace MS computers	---	---	---	---	362,500	---	---	262,500	---	---	262,500	---	---	237,500	---	1,125,000
	4 Replace ES computers	---	70,000	---	---	925,000	---	---	375,000	---	---	275,000	---	---	275,000	---	1,920,000
		---	70,000	---	---	1,687,500	---	---	1,050,000	---	---	837,500	---	---	862,500	---	4,507,500
	5 Teacher Computers	---	---	---	---	700,000	65,000	---	700,000	65,000	---	700,000	65,000	---	700,000	65,000	3,060,000
	6 AV Equipment	---	126,000	---	---	150,000	---	---	150,000	---	---	150,000	---	---	150,000	---	726,000
	7 Comp Repair Technician	---	---	---	39,726	---	---	39,726	---	---	39,726	---	---	39,726	---	---	158,904
	8 Repair, TV, Graphics Equip	---	---	---	---	105,000	---	---	50,000	---	---	25,000	---	---	45,000	---	225,000
	9 TV Dist System	---	26,000	---	---	82,400	---	---	30,900	---	---	23,700	---	---	---	---	163,000
	10 Van Equipment	---	---	---	---	---	---	---	40,000	---	---	40,000	---	---	---	---	80,000
		---	26,000	---	---	187,400	---	---	120,900	---	---	88,700	---	---	45,000	---	468,000
IV A	1 ITC Staff Dev Subs	---	---	---	---	---	78,000	---	---	78,000	---	---	78,000	---	78,000	---	312,000
School-Based Training																	

* Personnel includes salaried, hourly, full-time, and part-time positions.

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses.

FILE: P:COMB-6.XLS 4/24/94 2

BEST COPY AVAILABLE

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
IV B	1 Demo Lab	---	---	---	---	8,000	---	---	8,000	---	---	8,000	---	---	8,000	---	32,000
System	2 Develop Training Program	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Wide	3 Training Specialist	---	---	---	59,782	---	---	59,782	---	---	59,782	---	---	59,782	---	---	239,128
Staff	4 Training Center	---	---	---	---	---	---	---	90,000	24,000	---	---	24,000	---	---	24,000	162,000
Develop-	5 Inst Mat Specialist	---	---	---	59,782	---	---	59,782	---	---	59,782	---	---	59,782	---	---	239,128
ment	6 Update Train Center	---	---	---	---	---	20,000	---	---	20,000	---	---	20,000	---	---	20,000	80,000
	7 System Wide Subs	---	---	---	---	---	30,000	---	---	30,000	---	---	30,000	---	---	30,000	120,000
	8 Lending Library	---	---	2,500	---	---	2,500	---	---	2,500	---	---	2,500	---	---	2,500	12,500
	9 Training Services	---	---	---	---	---	10,000	---	---	10,000	---	---	10,000	---	---	10,000	40,000
		---	---	2,500	119,564	8,000	62,500	119,564	98,000	86,500	119,564	8,000	86,500	119,564	8,000	86,500	924,756
IV C	1 Production services	---	---	---	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	12,000
D of I Staff Development																	
V A	1 Dev Process	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Preview	2 Preview Center	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	---	---	5,000	25,000
Center	3 Site Licenses	---	---	7,500	---	---	39,000	---	---	39,000	---	---	39,000	---	---	39,000	163,500
		---	---	12,500	---	---	44,000	---	---	44,000	---	---	44,000	---	---	44,000	188,500
VI A	1 Consultant Services	---	---	10,000	---	---	5,000	---	---	---	---	---	---	---	---	---	15,000
Infomation	2 Networking Specialist	---	---	---	64,159	---	---	64,159	---	---	64,159	---	---	64,159	---	---	256,636
Distribution	3 Network Classrooms	---	---	---	---	852,617	---	---	852,617	---	---	852,617	---	---	852,617	---	3,410,468
Infrastructure	4 External Communications	---	---	---	---	---	10,000	---	---	10,000	---	---	10,000	---	---	10,000	40,000
		---	---	10,000	64,159	852,617	15,000	64,159	852,617	10,000	64,159	852,617	10,000	64,159	852,617	10,000	3,722,104

* Personnel includes salaried, hourly, full-time, and part-time positions

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

FILE P:COMB.6.XLS 4/24/94 3

BEST COPY AVAILABLE

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

4.2 APS Instructional Technology Strategic Plan: Summary of Implementation Costs

Objective	Action Step	FY 95 Personnel*	FY 95 Hardware Software	FY 95 Other**	FY 96 Personnel*	FY 96 Hardware Software	FY 96 Other**	FY 97 Personnel*	FY 97 Hardware Software	FY 97 Other**	FY 98 Personnel*	FY 98 Hardware Software	FY 98 Other**	FY 99 Personnel*	FY 99 Hardware Software	FY 99 Other**	Totals
VII A	1 Comp Equipment	---	85,000	---	---	---	---	---	---	---	---	---	---	---	---	---	85,000
School	2 Inst Tech Equipment	---	---	---	---	262,500	---	---	360,000	---	---	450,000	---	---	450,000	---	1,522,500
Based		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Funds		---	85,000	---	---	262,500	---	---	360,000	---	---	450,000	---	---	450,000	---	1,607,500
VII B	1 Identify Sources	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	15,000
External	2 ID Sale Materials	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Funding	3 Marketing Plan	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	---	---	3,000	15,000
Category Totals		181,876	408,300	138,900	1,831,331	3,985,017	508,700	1,965,186	3,557,517	537,900	1,965,186	3,315,817	557,400	1,965,186	3,254,617	403,900	24,576,833
FY Total			729,076			6,325,048			6,060,603			5,838,403			5,623,703		

* Personnel includes salaried, hourly, full-time, and part-time positions

** Other includes substitute teacher costs, consultant fees, lease fees, supplies, services, and licenses

FILE P:COMB-6.XLS 4/24/94 4

BEST COPY AVAILABLE

4.3 APS Instructional Technology Strategic Plan: Ongoing Initiatives

In addition to new initiatives, the IMT Department proposes to continue offering a number of ongoing services listed in the form of ongoing goals, objectives, and action steps. These appear in the following action plan.

Copyright (c) 1994, Arlington Public Schools, VA

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

ARLINGTON INSTRUCTIONAL TECHNOLOGY STRATEGIC PLAN
ONGOING INITIATIVES ACTION PLAN

GOALS		OBJECTIVES		ACTION STEPS	
I.	To support effective teaching and learning through the appropriate use of instructional technology.	A.	Provide assistance in accessing, retrieving, disseminating, and applying information.	1.	Coordinate the dissemination of select information to students and instructional staff through the provision of library services.
				2.	Develop information and instructional technology skills curricula for student instruction.
				3.	Provide modem communication stations and CD-ROM stations in every school library K-12 and in alternative programs.
II.	To support effective use of instructional technologies in instructional programs that cross disciplines or sites, or provide instructional technology or information foundation skills.	A.	Provide support to teachers in integrating technology into instruction.	1.	Supervise Higher Order Thinking Skills (HOTS) and the Kids Network programs.
				2.	Supervise Middle School and High School Computer Science courses.
				3.	Supervise Library Media and Information Skills programs.
				4.	Supervise Distance Learning courses.
				5.	Consult with schools regarding integrating technology into school-specific programs.
		B.	Provide ongoing instructional technology support to Curriculum Supervisors, Vocational, Technical and Special Education Program Coordinators to enhance instructional programs under their direct supervision.	1.	Serve in advisory capacity to ensure that instructional media recommended by Curriculum Supervisors, Specialists, Vocational, Technical and Special Education Program Coordinators are compatible with hardware found in the school, and meet appropriate instructional design criteria.
				2.	Facilitate communications among Curriculum Supervisors, Library Media Specialists, and Instructional Technology Coordinators regarding all curriculum projects involving instructional technology.
				3.	Support supervisors and teachers in the use of technology in the summer school program.
		C.	Provide ongoing instructional technology support to principals to enhance school based instructional programs.	1.	Serve as consultants to school based instructional technology planning teams in the spending of school based funds for hardware, software, and training.
				2.	Provide on-site support to, supervision of, and leadership for the Library Media Specialists and Building Computer Coordinators (BCCs).

Copyright (c) 1994, Arlington Public Schools, VA

GOALS		OBJECTIVES		ACTION STEPS	
III.	To provide ongoing support for instructional technology staff development training for IMT, instructional and administrative staff.	A.	Provide staff development, training materials, and resources for all IMT personnel.	1.	Support attendance at professional meetings and training events for IMT professional staff.
				2.	Support attendance at meetings and training events for IMT support staff.
				3.	Obtain instructional media and technology related resources and materials for the Professional Library.
				4.	Obtain training and development packages for use with IMT staff.
		B.	Provide staff development consulting services to schools, Curriculum Supervisors, Vocational, Technical and Special Education program coordinators in the development, implementation, and evaluation of school and department based instructional media and technology.	1.	Provide instructional media and technology staff development consulting services to schools, Curriculum Supervisors, and program coordinators.
				2.	Offer ongoing instructional technology system-wide training.
		C.	Provide training and funding support for instructional media & technology projects and programs coordinated by IMT.	1.	Fund instructional media & technology projects during the school year.
				2.	Offer training as part of project implementation.
IV.	To provide ongoing support and assistance to schools, Curriculum Supervisors, Vocational, Technical and Special Education Program Coordinators in the selection and purchase of instructional media and technology hardware and software, and issues pertaining to copyright.	A.	Facilitate Instructional Media and Technology selection, purchase and maintenance process, and provide copyright services.	1.	Provide guidelines for selection, acquisition, organization, and maintenance of books, print materials, video, computer software, AV hardware, and computer hardware.
				2.	Assist in initial collection development and hardware selection for new schools, programs, and projects.
				3.	Provide information and guidelines on copyright policy and licensing compliance.
				4.	Facilitate the review process for materials involved in censorship cases.
				5.	Develop bid specifications and purchasing guidelines related to instructional technology and media.
				6.	Serve as consultants to supervisors and principals in purchasing instructional materials and hardware.

Copyright (c) 1994, Arlington Public Schools, VA

GOALS		OBJECTIVES		ACTION STEPS	
V.	To support system-wide access to instructional resources through provision of media processing services.	A.	Provide ongoing media processing services through a system level Media Processing Center.	1.	Continue to process all instructional materials (e.g. library books, videos, computer software, filmstrips) for APS elementary, middle and high schools.
VI,	To sustain an effective instructional technology program through the provision of ongoing system-wide instructional technology services.	A.	Continue to provide instructional technology hardware maintenance and repair services to schools.	1. 2. 3.	Provide troubleshooting and repair services for AV and computer hardware. Coordinate BCCs in providing in-school troubleshooting and minor repair servicss. Maintain cable TV and electronic classroom facilities.
		B.	Continue to fund and distribute instructional technology supplies to schools.	1. 2. 3.	Fund and distribute select instructional computing supplies to schools. Fund and distribute select AV/TV supplies to schools. Fund and distribute select library media supplies.
		C.	Continue to provide communication services to schools and central instructional and administrative staff.	1. 2. 3. 4. 5.	Maintain computer and cable TV bulletin boards. Provide audioconferencing and videoconferencing services. Provide funding for instructional phone lines and on-line communication fees. Conduct periodic informational meetings with BCCs and Library Media Specialists. Respond to internal and external information requests related to instructional technology.
		D.	Continue to provide production services to schools and central instructional and administrative staff.	1. 2. 3. 4. 5.	Provide graphics services for administration and public information. Provide video services for administration and public information. Provide school-based and system-wide video production services for instruction. Provide school-based and system-wide graphics services for instruction. Provide teleconferencing services for instruction and staff development.
		E.	Continue to provide duplication services for schools and instructional and administrative staff.	1. 2. 3 4.	Provide licensed computer software duplication services. Provide video duplication services. Provide audio duplication services. Provide photocopy services in libraries.
		F.	Continue to provide facilities specifications and planning.	1 2. 3. 4. 5.	Provide facilities specifications and design for school library media centers. Provide facilities specifications and design for electronic classrooms. Provide facilities specifications and design for computer labs. Provide specifications for building-wide cabling. Provide facilities design for classrooms incorporating instructional technology.

Copyright (c) 1994, Arlington Public Schools, VA

GOALS		OBJECTIVES		ACTION STEPS	
VII.	To provide assistance with grants involving instructional technology.	A.	Continue to provide coordination and consultation in the application for and administration of specialiized grants.	1. 2. 3. 4.	Coordinate federal Chapter 2 grant program. Assist teachers with APS mini-grants. Advise schools about hardware purchases under supermarket program awards. Assist supervisors in completing grant applications.

5.0 ADDITIONAL NEEDS FOR FULL IMPLEMENTATION OF THE PLAN

To enable the IMT Department to fully implement the Arlington Public Schools Instructional Technology Strategic Plan outlined in this document, IMT proposes reorganizing current central office staff, adding building and central level staff, and retaining central office base funding. A brief discussion of these points follows.

5.1 IMT Departmental Reorganization

As the instructional technology plan is implemented, the IMT central office staff will be reorganized to facilitate ongoing programs and new initiatives. Reorganization plans will be developed by Fall 1994 and presented to the Assistant Superintendent for Instruction. Any impact on the FY96 budget due to this reorganization can be factored into the FY96 budget planning cycle that begins in Fall 1995.

5.2 Additional IMT Central Level Staff

The IMT Department presently lacks several key central level staff positions that are essential for implementation of all components of this plan. New positions reflect current and predicted IMT Department needs which may be met by reassigning and reconfiguring existing staff positions and responsibilities as well as by requesting new positions. Requests for new positions will be initiated over one or more years utilizing the annual new resources process.

Positions currently not assigned to the IMT Department that are considered essential for the full implementation of the five-year instructional technology plan include the following.

- A **Computer Systems Specialist** to expand instructional computing services offered to schools given the growth in the number and complexity of computer systems since 1983 as well as an increase in the number of systems to be installed and maintained in the future. Functions would include hardware and software installation, complex troubleshooting, customization of software, and training. This position was requested during FY92-93, and again in FY93-94, but was not approved due to budget constraints. The Computer Systems Specialist position can be created in FY95 through reconfiguring and upgrading an open position in the Office of Academic Computing. (New Initiatives Action Plan Goal III.A.1)

Copyright (c) 1994, Arlington Public Schools, VA

- A **Library Automation Programmer Analyst** to provide technical support and training for implementing the Northwestern Online Totally Integrated System (NOTIS), the library automation system selected by Arlington Public Schools. Functions would include developing computer applications such as program logic, coding, testing programs, and troubleshooting. The programmer analyst must have knowledge of NOTIS library system architecture and be familiar with library operations. This position will provide the interface between APS and the Office of Technology and Information Services (OTIS) and between APS and the Arlington Public Library. The Library Automation Programmer Analyst position can be created in FY95 through reconfiguring and upgrading an open position in the Media Processing Center. (New Initiatives Action Plan Goal I.A.5)

- An **Instructional Networking Specialist** to define hardware and software architecture, functional data and performance requirements, and design, install, and support instructional telecommunications and computer networks in the schools. This specialist will provide additional maintenance of, and training support for, instructional computing and telecomputing services. IMT will request this position for FY96. (New Initiatives Action Plan Goal VI.A.2)

- A **Training Specialist** to offer ongoing countywide instructional technology training workshops, develop training curriculum, and for FY96, coordinate all countywide instructional technology training and demonstrations planned for the Technology Demonstration Lab. Pending approval of a multimedia training facility for FY97, the Training Specialist would conduct and coordinate training held in this facility. (New Initiatives Action Plan Goal IV.B.3)

- An **Assistant Telecommunications Engineer** to help support the growth of new and existing audio and video based instructional technologies in APS. Functions assigned to this position would emphasize communications systems, radio frequency (R.F.) cable, fiber optics, satellite systems, and associated equipment installation and servicing. Technical support for digital, analog, video, audio and data communications equipment represent several additional responsibilities. Knowledge of new technology transport services such as fiber optics and satellite communications and the ability to follow schematics and block diagrams are requirements for an individual who would hold this position. (New Initiatives Action Plan Goal II.B.6)

- An **Instructional Materials Specialist** to oversee and conduct instructional media and technology hardware and software demonstrations and small group training in the Technology Demonstration Lab. This individual also will oversee the instructional materials preview and evaluation functions of the demonstration lab. In this role, the individual would serve as a central resource person for teachers, Library Media Specialists, and curriculum staff in the identification, acquisition, preview, evaluation, and adaptation of

Copyright (c) 1994, Arlington Public Schools, VA

externally produced computer software, print and video based materials, and film and slide tape materials for instructional purposes. Finally, this position would be responsible for negotiating licensing agreements for the use of externally produced instructional materials and provide copyright consultation services as needed. (New Initiatives Action Plan Goal IV.B.5)

- A **Computer Repair Technician** to provide repair support for instructional computing systems purchased by IMT, schools, and central office Curriculum Supervisors and Program Coordinators. Given the proposed purchase of computers to be issued to each Arlington teacher and the large number of replacement computers built into the strategic plan, additional computer repair help will be needed by FY96. (New Initiatives Action Plan Goal III.A.7)

- A **Distance Learning Instructional Development and Evaluation Specialist** to define, manage, develop, and evaluate distance learning instructional projects and courses. This position would be responsible for managing large scale instructional development projects, including performing needs analyses, assisting in the development of project objectives, translating instructional content into media scripts, and conducting formative and summative evaluations on distance learning courses and projects. (New Initiatives Action Plan Goal II.B.1)

It also is conceivable that additional central level positions will be needed as the instructional technology strategic plan is phased in and additional personnel support requirements become known (e.g., Instructional Television Producer Director; Graphics Artist / Designer).

5.3 Full-time Building Based Instructional Technology Coordinators

In addition to the need for expanded central IMT staff, IMT management also firmly supports focus group recommendations to hire full-time building based Instructional Technology Coordinators (ITCs) for instructional program support. (New Initiatives Action Plan Goal II.A.1)

IMT management strongly believes that for instructional technology to have a real impact on the instructional programs of Arlington Public Schools, each school should have one full-time Instructional Technology Coordinator. The position as envisioned will replace the current Building Computer Coordinator (BCC) position. ITCs will have the following responsibilities:

- Provide staff development and training

- Provide leadership on developing school-based technology plans

Copyright (c) 1994, Arlington Public Schools, VA

- Provide classroom support (training, modeling, routine maintenance)
- Coordinate and schedule instructional technology resources
- Serve as a liaison from the school to the IMT Department and to the school community
- Integrate technology into the curriculum and instructional practices of each school
- Carry out preliminary hardware and software troubleshooting and routine installations

Suggestions for funding these positions vary. The approach recommended by IMT is to fund an ITC position in each school. Another approach might be to reallocate current school staffing. Finally the ITC positions might by tied to planning factors based on enrollment.

IMT management believes that APS should expand its instructional technology hardware and software base only when these essential instructional technology building level support positions are in place. ITCs will ensure the proper implementation of instructional technologies, including the training of instructional staff in their use.

5.4 IMT Central Office Base Funding

It is important to maintain a base level of funding under central office IMT control. By maintaining base budgets:

- IMT can continue to fulfill its leadership role by initiating pilot projects and expanding successful programs
- IMT staff can purchase equipment and software in order to remain up-to-date and knowledgeable about the newer technologies, so that
  - responsible purchasing advice can be rendered
  - post-purchase technical assistance can be provided to the schools and to curriculum staff
- IMT can keep its operating equipment current and in line with the newer technologies in the schools
- IMT can continue to fund current licenses and agreements.

Copyright (c) 1994, Arlington Public Schools, VA

6.0 RESEARCH ON INSTRUCTIONAL TECHNOLOGIES: IMPACT ON INSTRUCTION AND SUPPORTING PRACTICES

Creating and sustaining a vital electronic community at the local level requires thoughtful consideration beyond the technological requirements. No one talks of whether or not implementation of instructional technologies is important for education, but rather how the technologies will be used to serve the students, parents, teachers, administrators and others in the school and community. Schools that fail to take advantage of emerging technologies may find themselves unable to effectively use the increasingly complex electronic resources that currently are integral workplace tools in the business community and will become available to educators in the near future (Education Week, 1994).

An extensive body of research exists in support of the positive impact of instructional technologies on student learning. A summary of this research follows.

Computers and Instruction

From research we know the following.

- Computer-assisted instruction can give most students a measurable advantage compared with those receiving traditional instruction (Niemiec & Walberg, 1987).
- Low achieving students can master higher order thinking skills using computers (Pogrow, 1986).
- Students receiving computer-assisted instruction have shown significant increases in reading and writing skills as well as mathematics and science achievement (Rockman, 1988).
- Special education students benefit greatly from the increased motivation, greater degrees of success, and independence that computers can provide (Schmidt, Weinstein, Niemiec, & Walberg, 1985-86).
- Students using computers for instruction show increased cooperation and improved learning as a result of peer tutoring (Johnson, Johnson, & Stanne, 1986).
- Using computers for instruction enhances student interest in and attitudes towards writing and science and raises self-esteem among those students who typically fail in the traditional classroom (Souviney & Miller-Souviney, 1986).

Copyright (c) 1994, Arlington Public Schools, VA

- Computers permit teachers to create functional learning environments where students deal with "real life" problems rather than responding to textbook chapters as the content of instruction (Riel, 1985).

- Introducing technology (both stand-alone and networked) into the learning environment makes learning more student-centered, encourages cooperative learning, improves students' self-concepts and attitudes toward learning, and stimulates increased teacher-student interaction (Software Publishers Association, 1990-92).

- At-risk students achieved significant improvements in attendance, in academic performance, and in attitude when placed in a special program in which technology played a prominent role (Braun, 1990).

- The most dramatic examples of changes in learning environments through technology have taken place with handicapped students. New computer and information technologies provide flexible, powerful tools that permit individualized support functions for students with handicaps (Behrmann, 1990).

- According to researchers at the Stanford Research Institute, several meta-analyses have shown significant advantages for computer-assisted instruction and videodisc-based instruction over traditional methods (United States Department of Education, Office of Educational Research and Improvements, 1992).

- Hypermedia systems and other well designed applications tend to encourage active processing on the part of students and support higher order thinking by engaging students in authentic complex tasks within a collaborative learning context (United States Department of Education, Office of Educational Research and Improvements, 1992).

Multimedia and Instruction

Multimedia incorporates technologies that already are a part of our culture. Computers, videodiscs, CD-ROM, video cassette recorders, television, and video cameras are technologies used in schools--all are inherent to multimedia. A dozen educators and industry people interviewed by Isabelle Bruder (1991) affirmed that multimedia is an effective instructional tool.

> Multimedia supports all the multiple intelligences not necessarily supported through a text-dominated environment. Multimedia reaches all the senses, which enhances learning and can be tailored to the learning styles of individuals whether they are visual, verbal, auditory, or physical learners (D'Ignazio, 1991).

Copyright (c) 1994, Arlington Public Schools, VA

In a recent National School Boards Association's Institute for the Transfer of Technology to Education "Insider's Letter," the technology of today and it's promise for tomorrow's electronic community was outlined. "Personal computers, cable and broadcast television, satellite connections and telephone lines can combine to bring multimedia communications and information systems to schools (Ward, 1994)."

CD-ROM technologies have transformed research by providing students with exciting alternatives to less motivating and less efficient means of searching for specific data. The excitement generated by CD-ROM programs, the fact that CD-ROM technology encourages students to employ critical thinking skills, the appeal of CD-ROM programs to students of multiple learning styles, and that CD-ROM programs are becoming reasonably priced as well as widely available enable students to become self-directed learners who are engaged in finding information on both assigned topics and topics of further interest to the students (Singer, 1991).

Modem Communications and Instruction

The Internet is a vast electronic network that connects thousands of sites and millions of computer users all around the world. Through the Internet, teachers, librarians, and students are provided access to a wide range of online databases, library references, and opportunities to discuss and investigate an almost unlimited range of subjects with experts, mentors, educators, or students worldwide. With the implementation of the proposed National Information Infrastructure (NII), new and more diverse resources are sure to follow.

Distance Learning and Instruction

Rapidly developing telecommunications technologies are creating electronic links used for learning and are resulting in the creation of new neighbors and collegial ties among schools, classrooms, teachers, students, and other members of the community. Distance learning has increased dramatically over the past five years. The United States Congress Office of Technology Assessment (OTA), in its report "Linking for Learning," finds that while distance learning initially served isolated rural schools and some urban systems, current uses go beyond the needs of these communities. School systems carry advanced and specialized courses, training, and seminars for teachers. Distance learning links learner communities with each other and brings a wide array of experts and information to the classroom. Although research on distance learning is not extensive, distance learning aggressively has been adopted in many areas. In most instances, distance learning appears to be as effective as on-site, face-to-face instruction in the classroom (Moore, 1989).

Copyright (c) 1994, Arlington Public Schools, VA

> Distance Learning can be used to meet educational needs. One need is the provision of instruction in mandated courses or advanced, specialized courses in schools where teachers are not available or are too costly to provide for a limited number of students. A second need is the provision of training and staff development for teachers in locations where experts and resources are not readily available (United States Congress, Office of Technology Assessment, 1989).

Distance learning has dual impact on teachers: as a tool for teaching and as a means to upgrade their own skills and professional development. Although it is a technology that removes barriers and provides opportunities, as with all instructional technologies, it is the teacher who teaches.

In distance learning, teachers find that they are required to change their method of teaching and give more attention to preparation, student interaction, visual materials, and independent as well as follow-up activities. Teachers who work with other colleagues via distance learning systems are finding opportunities to share, team teach, and peer mentor. The technology itself could be a mechanism for boosting the professionalism of teachers.

Teacher Training

The responsibilities for effective instruction and a responsive learning environment remain with the teacher. This critical role means that all teachers must have training, preparation, and instructional support (United States Congress, Office of Technology Assessment, 1988). Teacher-student interactions and the instructional setting are important considerations in gaining maximum effectiveness from technology use (United States Congress, Office of Technology Assessment, 1989). After years of research on instructional materials, strong evidence points to the fact that implementation is the most important factor (Elmore & McLaughlin, 1988). What a teacher does with technology is more important than the technology itself.

Bialo & Sivin (1990) report that:

> technology cannot affect the ways in which students and teachers interact by itself. Also needed are teachers who are skilled at structuring effective learning environments and who are flexible in the roles they will play--sometimes lecturer, sometimes tutor, sometimes poser of thought-provoking questions, sometimes project manager, sometimes diagnostician...the use of educational technology does not occur in a vacuum. Schools must provide an instructionally caring learning environment. Creating such an environment depends on well-trained teachers.

The Office of Technology Assessment reported that technology cannot be fully effective unless teachers are offered the choice of using computers and unless those who choose to use them receive training and support. OTA identified four

APS Instructional Technology Strategic Plan
Copyright (c) 1994, Arlington Public Schools, VA

interrelated conditions that must be met in order for technology to be fully effective: continual training in the skills needed to work with the technology, education that provides vision and understanding of state-of-the-art developments and applications, support for experimentation and innovation, and--perhaps most valuable of all--time for learning and practice (United States Congress, Office of Technology Assessment, 1988).

Changes in teacher behaviors, attitudes, and skills do not happen overnight. Change is more lasting when educational leaders work with teachers on a number of occasions over an extended period of time with appropriate feedback (Valencia & Killion, 1988). In addition, studies have shown that long-term training efforts are more likely to succeed than short-term ones (Mohlman, Kierstead, & Gundlach, 1982).

Research has found that the regular moment-to-moment and day-to-day interactions with peers facilitate and often determine the success or failure of change. Thomas Guskey (1985) reports:

> In most cases, some time and experimentation are necessary for teachers to fit the new practices to their unique classroom conditions. Support during this period of trial and experimentation is critical. Teachers need continuous guidance and direction in order to make adaptations while maintaining program fidelity.

A report from the Software Publishers Association (1990-92) identified factors that maximize the benefits of educational technology in instruction, including:

- extensive teacher training in the integration of technology into the curriculum
- active participation by teachers in learning activities that incorporate tool software
- direct access by teachers to computers for productivity (i.e., there is a computer on the teacher's desk).

In-School Support for Increasing Teacher Use of Technology

Teachers also need to know that assistance is easily accessible if problems or unexpected difficulties develop. Research states that when teachers are implementing new techniques, they use them more effectively and appropriately when training and technical support are readily available (Featherstone, 1986). Follow up procedures that incorporate coaching and collegial sharing and include ongoing staff development are crucial forms of support.

Copyright (c) 1994, Arlington Public Schools, VA

The RAND Corporation outlines the policies and practices that increase teacher use of computers in instruction (Elmore & McLaughlin, 1986). A number of themes reoccur, including:

- increasing the number of computers available for instruction
- assistance in integrating computers into the curriculum from an in-school resource person
- training
- special recognition for teachers
- providing compensation for computer-using teachers, and
- involving teachers in the decision making process.

The RAND report also outlines policies and practices that increase teacher participation in staff development. By increasing the number of computers available for instruction, more hands-on training is possible. Teachers see both as evidence of commitment on the part of administrators. Additionally, the report states that teachers need prompt and unrestricted access to computers, especially immediately after training, readily available school-based resource people for follow up training and technical help, and training sites that are accessible and contain appropriate hardware and software. Overall, it is preferable to conduct staff development in the teachers' base school building.

Wiske (1988) concluded that there are three general factors which influence a teacher's decisions to use technology: 1) the teacher's knowledge of appropriate uses of computers, 2) access to necessary resources and support, and 3) incentives that favor or discourage computer use in the classroom.

Becker (1994) found a consistent relationship between exemplary teaching when using computers and substantial investment in supporting and training personnel. As a result of his research findings, Becker identified the following conditions that are most likely to nurture exemplary teaching using technology.

- Exemplary computer-using teachers are more often in a setting where there are many other teachers also using computers.
- Exemplary teachers are much more likely to be found in schools where there is a full-time computer coordinator who directs school-level computing activities. They also are more likely to have access to formal district staff development activities.

Copyright (c) 1994, Arlington Public Schools, VA

- Exemplary use of technology is most likely to take place in schools where the administration takes an active role in encouraging equity of access to technology across categories of students (ethnic background, gender, ability level, and so on).

- Exemplary teachers work in settings where school and district resources have been used to create supportive conditions.

Central Office and School-based Program Coordination

Other findings stress system level support and commitment. Increases in the amount of hardware, inservice, and incentives are seen as evidence of administrative commitment and support, as are system-wide computer master plans.

According to Daniel Kinnamon (1994), for a school district to tap the power of technology successfully, it must effectively balance central planning with site-based management. Kinnamon refers to a liaison / coordinator model. This model works because it allows the district leadership and the liaison / coordinator to distribute decision making power across the district's faculty and staff without sacrificing cohesion or consistency. Under a district wide agreed upon framework, each school is free to acquire and allocate technology resources in a way that will best serve the needs and goals of its particular school community.

Concluding Remarks on Research

During the past 20 years computers have become smaller, less expensive, significantly faster, and have grown vastly in memory capacity. Advances in TV and communication technologies are developing at a rapid rate. The question is not whether technology is effective but rather how do we best utilize and capture the potential of the emerging technologies.

As we contemplate this question, we must keep in mind other issues highlighted by research. There still is a technology gender gap. Female students should receive additional encouragement to master the skills and knowledge associated with instructional technologies. When integrating technology use into instruction, teachers must be sensitive to the fact that most girls perform better in collaborative activities (Rockman, 1992). Nationally, equity problems do persist in that white students, males, and students from higher socioeconomic backgrounds or with higher academic abilities generally have greater access to technology and use technology in more cognitive demanding ways. These factors play an important part in providing the highest quality instructional experiences to our students.

Copyright (c) 1994, Arlington Public Schools, VA

In summary, a rapidly growing body of research supports the belief stated below.

> Learning technologies are essential for successful education change. They have enormous potential to stimulate and enhance education reform and to prepare students to be productive workers and responsible citizens in the 21st century. Many states, districts, schools, and classrooms have used technology to create innovative, stimulating, effective learning environments (Council of Chief State School Officers, 1991).

Copyright (c) 1994, Arlington Public Schools, VA

7.0 AN HISTORICAL PERSPECTIVE OF PROGRAM GROWTH IN THE ARLINGTON PUBLIC SCHOOLS

For more than a century, APS has provided an education to its citizens which reflects the changing needs and aspirations of the community through the years and mirrors the society of which it is a part. In many respects, the evolution of public education in Arlington typifies the pattern throughout the United States.

The first era of public education in Arlington reflected the agricultural character of the county. Scattered hamlets throughout the area began to organize schools to educate their children in rudimentary skills and knowledge. These rural schools, which typified nineteenth century America, were devoted to the three R's and largely devoid of modern learning resources. The blackboard and chalk served as principal technologies for teachers and pupils, along with factual recitations and memorization.

Arlington's development has always been tied to the expansion of the federal government and the growth of the nation's capital. World Wars I and II both contributed to the growth of Arlington as a suburban Washington community. Population increases stimulated growth of the public school system, including the addition of secondary schools. During this period, the Arlington Public Schools were racially segregated. The educational system at this time was dominated by a print-bound culture and textbooks became the principal means of organizing instruction. While Arlington never has been characterized as industrial, the growth experienced during this period occurred during the decades that were dominated by American industrialization. In the latter years of this educational era, libraries and audiovisual resources became institutionalized within the school system, offering new options for teaching and learning.

Modern Arlington has been evolving over several decades. The county has become an urbanized enclave with mini-cities emerging along Route One and the Metro corridor. The influx of multi-ethnic populations has created an increasingly pluralistic culture. The school system has responded to numerous political and social forces over the last several decades including a strong demand for quality, racial integration of the system, and the enrollment of large numbers of ethnic students principally from Asian and Latin American countries. These students, representing more than fifty language groups, have challenged the system's instructional program and created new needs. The African American community has sought both equality and empowerment for all of its students. In addition, extensive special education programs and services have further expanded the school division's scope of responsibility.

Copyright (c) 1994, Arlington Public Schools, VA

Contemporary Arlington is characterized by diversity and linked to a larger metropolitan area of four million people. Its school system is undergoing rapid change as it attempts to project educational needs into the 21st century. In a society now dominated by information generation, processing, and dissemination, the character of the school system is being reshaped by multiple forces, including the application of new electronic technologies to communications, information access and retrieval, instructional delivery, and teacher-student productivity.

The report by the Futures Planning Steering Team offers the most current conceptualization of educational philosophy stated in pragmatic terms. One aspect of the report deals with the question of quality. In that regard the report states that "[the] Steering Team is committed to providing all children with an education that meets diverse learning needs and prepares them for the global, interdependent and technological society that will assist them." (p. v)

In relation to instructional delivery systems, the Futures Planning Steering Team report identifies some assumptions.

> The delivery of instruction is responsive to the multiple ways in which children learn, including regular opportunities for hands-on learning, technology-enriched learning, and learning from textbooks. Instruction is delivered using a variety of teaching methods and styles and provides opportunities for children to demonstrate and apply their knowledge.
>
> A quality education ensures that all students acquire basic skills and are encouraged to develop as thinkers, problem solvers, and writers. Quality education also requires students to make connections and apply skills across the disciplines. Aided by curriculum and delivery methods, quality education must provide a variety of ways to engage, challenge, and motivate students who learn in many ways. (p. 34)

In this context, the Instructional Media and Technology management team has prepared this five-year instructional technology strategic plan. The plan addresses the needs of learners, teachers, and administrators and equips and undergirds the instructional program for the 21st century.

Copyright (c) 1994, Arlington Public Schools, VA

8.0 SUMMARY

The APS Instructional Technology Strategic Plan described in this document is an ambitious one that will require extensive new resources and the reprioritization of existing resources. Highlights of the plan are listed below.

- Implementing the library automation project
- Hiring full-time building based Instructional Technology Coordinators
- Expanding the distance learning program at the high school level and introducing this delivery system to the middle and elementary schools
- Purchasing laptop computers to be issued to each teacher
- Completing a schedule of recommendations and procedures for hardware replacement and software upgrades
- Replacing all obsolete classroom and lab computer systems
- Replacing obsolete audio visual and television equipment in the schools
- Upgrading IMT television production and distribution equipment, graphics production equipment, and all maintenance / diagnostic equipment
- Replacing the outdated and unreliable cable television automated programming system and the ETV production recording / mastering system
- Initiating comprehensive school based and system-wide instructional technology staff development programs and facilities
- Establishing a permanent dedicated capital equipment replacement fund
- Networking all classrooms to libraries and to each other for sharing data and video
- Expanding access to state, national and international computer networks and electronic bulletin boards
- Establishing baseline instructional technologies
- Increasing school based instructional technology equipment funding through future increases in planning factor allocations

Copyright (c) 1994, Arlington Public Schools, VA

- Initiating annual discipline-based IMT grants
- Identifying potential sources of external funding
- Exploring new ways that instructional technology can be employed to extend and enhance communication among APS staff, parents, local businesses and libraries.

IMT will propose a department-wide restructuring of personnel roles and responsibilities in Fall 1994 before new positions are requested via the new resources process. The plan's full implementation will require expanding IMT Department staff.

It should be reiterated that current baseline budgets found in the various IMT budget lines should be retained and, wherever possible, increased.

Finally, this strategic plan represents a living document that must be reviewed and updated each year. Annual updates of the plan will occur in consultation with Principals, Curriculum Supervisors, Senior Staff, the School Board, the IMT Advisory Committee, the Arlington Council on Instruction, Library Media Specialists, and other interested APS groups and individuals.

It is the firm belief of IMT management that instructional technologies can have significant impact on the instructional programs of Arlington Public Schools. Dr. William C. Bosher, Jr., Virginia's Superintendent of Public Instruction, is a firm believer in the importance of instructional technology. In a recent interview he stated:

> Young people are buying at the retail stores virtual reality, where they can simulate multidimensional learning experiences. If the schools continue to use flat linear approaches when young people are in a new world of technology, then we will lose them by the absence of methodologies to which they've been accustomed (Virginia Middle School Association, 1994).

Adoption of the Arlington Public Schools Instructional Technology Strategic Plan will provide Arlington students with the methodologies referred to by Dr. Bosher, thus preparing our students for their successful entry into the 21st century.

Copyright (c) 1994, Arlington Public Schools, VA

BIBLIOGRAPHY

Arlington Public Schools. (1993, June). Report to the Superintendent: Futures Planning Steering Team. Arlington, VA.

Bosher, W. (1994,Winter). Virginia Middle School Association Newsletter, pp. 1-2.

Becker, H.J. (1994). "How Our Best Computer-Using Teachers Differ from Other Teachers: Implications for Realizing the Potential of Computers in Schools." Journal of Research on Computing in Education, (26).

Behrmann, M. (1990). Learning Environments for Handicapped Students. Fairfax, VA: George Mason University, The Center for Human disAbilities.

Braun, Ludwig. (1990, October). Vision: TEST (Technology Enriched Schools of Tomorrow), Recommendations for American Educational Decision Makers. Eugene, OR: International Society for Technology in Education.

Bruder, I. (1991,September). "Multimedia: How it Changes the Way we Teach and Learn." Electronic Learning, pp. 22-26.

Council of Chief State School Officers, (1992). Learning Technologies Essential for Education Change. Washington, DC.

Education Week. (1991, March). "Technology." Education Week 13,(26), p.8.

D'Ignazio, F. "Industry News," Electronic Learning, 11(1), pp.22-26.

Elmore, R.F. & McLaughlin M. W. (1988). Steady Work: Policy, Practice and the Reform of American Education. Santa Monica, CA: The RAND Corporation Center for Policy Research

Featherstone, H. (1986). "Schools Where Teachers Learn: Promising Directions for Staff Development." The Harvard Education Letter.

Guskey, T. (1985). "Staff Development and Teacher Change." Educational Leadership.

Copyright (c) 1994, Arlington Public Schools, VA

Hurly, P. & Hylnka, D. (1982). "Prisoners of the Cave: Can Instructional Technology Improve Education?" Paper presented at the National Conference on Instructional Technology, National Research Council of Canada. ED244608.

Johnson, R., Johnson, D. & Stanne, M. (1986). "Comparison of Computer-Assisted Cooperative, Competitive, and Individualistic Learning." American Education Research Journal, 23, (3), pp. 382-392.

Lunley, D. & Bailey, G. (1993). Planning for Technology, A Guidebook for School Administrators. New York: Scholastic, pp. 1-2.

Kinnaman, D. (1994). "The Leadership Role." Technology & Learning, 14(5), p.62.

Mohlman, G., Kierstead, J., & Gundlach, M. (1982). "A Research-Based Inservice Model for Secondary Teachers." Educational Leadership.

Niemiec, R. & Walberg H.J. (1987). "Comparative Effects of Computer-Assisted Instruction: A Synthesis of Reviews," Journal of Educational Computing Research, 3(1), pp.19-37.

Pogrow, S. (1986). Using Computers to Develop Thinking Skills: Creating HOTS Environments. Tucson, AZ: University of Arizona.

Riel, M.M. (1985). "The Computer Chronicles Newswire: A Functional Learning Environment For Acquiring Literacy Skills". Journal of Educational Computing Research, 1(3), pp.317-337.

Rockman, S. (1988, Fall). "Research on Technology in Schools." Apple Education News.

Rockman, S. (1992)."To Lead or to Follow: The Role and Influence of Research on Technology." Learning Technologies Essential for Education Change, Washington, D C.: Council of Chief State School Officers.

Schmidt, M., Weinstein,T., Niemiec,R., & Walberg, H. (1985-86). "Computer Based Instruction With Exceptional Children: A Meta-Analysis of Research Findings." Journal of Special Education, 19, pp. 493-502.

Copyright (c) 1994, Arlington Public Schools, VA

Singer, L. (1991,March/April) "The Attraction of CD-ROM in the Media Center." Media & Methods.

Software Publishers Association. (1990-92). Report on the Effectiveness of Technology in Schools. Washington, DC.

Souviney, R. & Miller-Souviney, B. (1986). Integrating Computers And The Writing Process. (Research Report #11). San Diego, CA: University of California, Interactive Technology Laboratory.

United States Congress, Office of Technology Assessment, (1989). Linking for Learning: A New Course for Education. (OTA-SET-430) Washington, DC: U.S. Government Printing Office.

United States Congress, Office of Technology Assessment, (1988). Power On! New Tools for Teaching and Learning. (OTA-SET-379) Washington, DC: U.S. Government Printing Office.

United States Department of Education, Office of Educational Research and Improvements. (1992). Using Technology to Support Education Reform. Washington, DC,: U.S. Government Printing Office.

Valencia,S. & Killion, J. (1988). "Overcoming Obstacles to Teacher Change: Direction from School-Based Efforts." Journal of Staff Development.

Ward, A. (1994,March). "Today's Technology for Tomorrow's Electronic Community." NSBA's Insider's Letter.

Wiske,M. (1988). How Technology Affects Teaching. Cambridge, MA: Educational Technology Center.

Copyright (c) 1994, Arlington Public Schools, VA